# XV.

## *A History of the Fishes of Massachusetts.*

By DAVID HUMPHREYS STORER, M. D., A. A. S.

(*Continued from Vol. VI. p.* 372.)

### GENUS II. PLATESSA, Cuv.

Body rhomboidal, depressed; both eyes generally on the right side of the head, one above the other; a row of teeth in each jaw, with others on the pharyngeal bones; dorsal fin commencing over the upper eye, that fin and the anal extending nearly the whole length of the body; but neither of them joined to the tail; branchiostegous rays six.

### *Eyes on the Right Side of the Head.*

#### PLATESSA PLANA, *Storer.*

#### *The Flounder.*

(PLATE XXX. FIG. 2.)

*Pleuronectes planus, New York Flat-fish*, MITCH., Trans. Lit. and Phil. Soc. of N. Y., I. p. 387.
*Platessa plana, Flounder of Massachusetts*, STORER, Report, p. 143.
" " *New York Flat-fish*, DEKAY, Report, p. 295, pl. 48, fig. 154, and pl. 49, fig. 158.
" " AYRES, Bost. Journ. Nat. Hist., IV. p. 276.
" " STORER, Mem. Amer. Acad., New Series, II. p. 476.
" " " Synopsis, p. 224.

*Color.* The smaller and middling-sized specimens, when first taken from the water, are of a greenish-brown tinge, more or less spotted and blotched with rusty brown. The larger individuals are of a general rusty-brown color; or a dark, blackish brown, or a dull slate-color scarcely exhibiting any spots. The left side is colorless. Pupils black, irides golden. The dorsal, anal, and caudal fins are yellowish-brown; the two former are generally blotched with darker brown. The pectorals and ventrals are of the color of the right side of the fish.

*Description.* The greatest depth of this species is less than half of its length exclusive of the tail. The head is about two fifths the length of the fish includ-

ing the tail. The mouth is small, the lips are fleshy. A single row of compact, prominent, incurved, trenchant teeth, slightly notched on the cutting edge, form a continuous line from the angle to the centre of each jaw. On the upper jaw is one tooth, on the lower jaw are two teeth, on the side of the jaw next the colored side. The right half of the jaws, or the half next the colored side of the fish, edentate. The eyes are large, oblong; their longest diameter less than one fifth the length of the head. The space between the eyes, which is covered with scales, at its middle portion is equal in width to about one third the long diameter of the eye.

The lateral line, commencing at the anterior inferior angle of the inferior eye, curves backwards and upwards just behind the eyes to the posterior angle of the upper eye, then passes backwards along the edge of the gill-covers to the superior angle of the operculum, from whence, after making a slight curve over the pectorals, it pursues a straight course to the tail.

The dorsal fin commences anterior to the middle of the upper eye, and gradually increases in the length of its rays towards its posterior half, when it beautifully curves to its termination, at the origin of the fleshy portion of the tail.

The pectorals are situated just beneath the posterior angle of the operculum: their height is nearly equal to half the length of the head; the central rays are bifid at their posterior extremities.

The ventrals, which are of moderate size, arise on a line just anterior to the pectorals, and their extremities project beyond the commencement of the anal fin.

At the origin of the anal fin is situated a strong spine, which is nearly concealed by the flesh.

The anal fin arises on a line with the anterior third of the pectorals, and terminates opposite the termination of the dorsal fin.

The caudal fin is rounded when expanded.

The rays of the fins are scaled, — and the extremities of those of the dorsal and anal are free.

The fin rays are as follows: — D. 61. P. 10. V. 6. A. 46 – 48. C. 17.

Length, from twelve to twenty-one inches.

*Remarks.* This is the most common flat-fish taken in the waters of Massachusetts. It is captured in considerable quantities throughout all the warm season of the year near the shore, from the wharves and bridges; and in the winter is speared through the ice. The finest brought to Boston market are taken from around Deer Island, — and those from that locality frequently measure from twelve

to eighteen inches. The largest specimen of this species I have ever seen measured twenty-one inches in length, and seventeen in width.

Massachusetts, STORER. Connecticut, LINSLEY, AYRES. New York, MITCHILL, DEKAY.

### PLATESSA DENTATA, *Storer.*

### *The Flounder of New York.*

(PLATE XXX. FIG. 3.)

*Pleuronectes dentatus, Flounder of New York,* MITCH., Trans. Lit. and Phil. Soc. of N. Y., I. p. 390.
*Platessa dentatus, Flounder of New York,* STORER, Report, p. 143.
" " " " DEKAY, Report, p. 298.
" " STORER, Mem. Amer. Acad., New Series, II. p. 476.
" " " Synopsis, p. 207.

*Color.* All the right side of the body and the fins of a uniform reddish-brown. Pupils black, irides golden.

*Description.* Body elongated. The length of the head to the whole length of the body, exclusive of the caudal fin, about as one to four. The eyes are situated upon the right side of the body, and placed over each other, — the upper slightly posterior, — separated by a bony ridge, covered with scales similar to those over the whole head. The longest diameter of the eye nearly equal to one sixth the length of the head. The mouth is very large, the perpendicular gape being nearly equal to two thirds the length of the head; the upper jaw projects slightly beyond the lower; both jaws are furnished with a single row of prominent, sharp teeth, separated from each other, so that when the mouth is closed the teeth of one jaw shut into the space between those of the opposite jaw; the lower jaw has a blunt, bony tubercle at the chin. The lips are small.

The lateral line is nearly straight, making only a scarcely perceptible curve over the pectoral fins.

The dorsal fin commences just over the middle of the eye, and terminates at the base of the fleshy portion of the tail; the first rays are quite short, and gradually lengthen towards the middle of the fin, whence they again diminish posteriorly.

The pectorals are subtriangular, and nearly half the length of the head.

The third and fourth rays of the ventrals are the longest; the posterior ray is very minute.

The anal fin commences on a line beneath the middle of the pectorals, and terminates opposite the dorsal fin. The edges of the dorsal and anal fins on the right side are fringed by the continuation of the whiteness of the left side upon them.

The fin rays are as follows: — D. 98. P. 11. V. 6. A. 70 – 75. C. 18.

Length, twelve to twenty-one inches.

*Remarks.* This species is frequently taken in the winter season at Provincetown; and is occasionally brought to Boston market. It is a sweet fish, but is not generally relished as well as the *P. plana.* It is known as the *Sand-dab.* The largest specimen I have seen, measured twenty-one inches in length, and weighed three and a half pounds.

Massachusetts, STORER. Connecticut, LINSLEY, AYRES. New York, MITCHILL, DEKAY.

## PLATESSA FERRUGINEA, *Storer.*

### *The Rusty Flounder.*

(PLATE XXX. FIG. 4.)

*Platessa ferruginea, Rusty Dab,* STORER, Report, p. 141, Plate II.
" " *Rusty Flat-fish,* DEKAY, Report, p. 297.
" " STORER, Mem. Amer. Acad., New Series, II. p. 476.
" " " Synopsis, p. 224.

*Color.* All the right side of the body is of a reddish slate color, with a tinge of green, covered with numerous large, irregularly formed ferruginous spots. The fins have the color of the body. Beneath, of a clear white, except the posterior portion in front of the caudal fin, the caudal fin, and the margins of the dorsal and anal, which are a lemon yellow. The pupils are black, the irides golden.

*Description.* Body elliptical. The depth of the body is rather more than one third the entire length of the fish. Its surface is roughened by the scales. The length of the head is less than one fourth the length of the fish. The mouth is small; the lips are tumid. The jaws are equal, with a row of numerous small teeth in each jaw; those upon the colored side of the upper jaw are very minute. The anterior nostril is tubular. The eyes are large, and separated by a bony ridge, which arises in front of the centre of the upper eye, (the fish being placed upon its belly with the tail towards the describer,) and, passing in front of and around that eye, goes backwards and downwards to the posterior superior angle of the operculum, where the lateral line commences. The lateral line at its origin curves upward to a height equal to about one fourth the length of the head; and at the distance of about one half the length of the head from its commencement assumes a straight course, which it pursues to the extremity of the caudal fin.

The dorsal fin arises over the anterior third of the upper orbit, and its rays gradually increase in their length towards its middle, where they are longest. This

fin terminates in front of the caudal rays at a distance equal to about one third of their height: the extremities of the rays, which are white, are free, and resemble small filaments or tentaculæ.

The pectorals are situated at the posterior angle of the operculum; the extremity of the first ray reaches the arch of the lateral line at its centre.

The ventrals are opposite the pectorals, and extend to the origin of the anal fin.

Just anterior to the anal fin is a strong horizontal spine, almost concealed by the flesh.

The anal fin commences under the posterior third of the ventral fins, and terminates on a plane with the dorsal fin: this fin is of the same form as the dorsal; like it, its longest rays are towards the centre of the fin; and the tips of the rays are free.

The caudal fin is rounded; its central rays are three fourths as long as the head.

The fin rays are as follows: — D. 84. P. 10. V. 6. A. 65. C. 16.

Length, eighteen to twenty inches.

*Remarks.* This species is occasionally brought to Boston market, in the winter and early spring, from the northwestern coast of Massachusetts Bay, and principally from the vicinity of Cape Ann, where it is taken in about thirty fathoms of water.

Massachusetts, STORER. New York, DEKAY.

### PLATESSA GLABRA, *Storer.*

### *The Plaice of Massachusetts.*

(PLATE XXXI. FIG. 1.)

*Platessa glabra, Plaice*, STORER, Proceed. Bost. Soc. Nat. Hist., I. p. 130.
" " " " Mem. Amer. Acad., New Series, II. p. 477.
" " " " Synopsis, p. 225.

*Color.* Above grayish, mottled with dark brown: dorsal, anal, and caudal fins reddish-yellow, with well-marked, nearly black spots, more or less oval, differing in their size. Ventrals of a light brown.

*Description.* Body elongated, perfectly smooth. The length of the head is rather less than one fifth of the whole length of the fish, including the tail. The eyes are prominent, not so much so, however, as in the *plana;* the inferior eye hardly in advance of the upper. The lips are fleshy. The mouth is very protractile. Numerous sharp, cylindrical, somewhat conical teeth exist in both jaws; those on

that portion of the jaw next to the colored side are the smaller. The nostrils are directly in front of the eyes; the anterior is tubular. Between the eyes is a smooth ridge, covered by the common cuticle of the head as far back as the posterior angle of the orbit of the upper eye; from this point it becomes naked and rough, and is continued back to the superior angle of the operculum, where it is much larger than at any other point, terminating obtusely; between the extremity of this and the commencement of the lateral line is a smaller bony tubercle, apparently separated from the former.

The lateral line commences just back of the outer edge of the tubercle just referred to, and continues nearly in a straight course to the posterior extremities of the caudal rays.

The dorsal fin commences above the superior anterior angle of the upper eye, and gradually increases in the height of its rays towards its posterior half, the height of the longest rays being five times that of the first rays; this fin terminates at the base of the fleshy portion of the caudal fin, its last ray being of about the same height as the first ray.

The central rays of the pectorals are bifid.

The ventral rays do not extend to the anal.

The anal fin is formed like the dorsal, and terminates on a line with it. The rays of this fin, as well as of the dorsal, are somewhat scaled.

The caudal fin is slightly rounded when expanded.

The fin rays are as follows: — D. 62. P. 9. V. 6. A. 41. C. 16.

Length, eight inches.

*Remarks.* This species differs from the *plana* in the smoothness of its body; in the situation of the eyes; in its less distorted mouth; in the bony ridge upon its head; in the much greater thickness of its body; in its ventral fins not reaching the anal fin; in its caudal rays being almost destitute of scales; in there being scarcely any curve at the origin of the lateral line; in the number of the dorsal and anal fin-rays; and in the rays of the fins being stouter.

Besides these external differences between this species and the *plana*, the different form of the teeth in the jaws of the two species, the absence of teeth on the hyoid bone of the *plana*, the comparative lengths of their intestinal tubes, and the difference in form of the cœcal appendices, are very striking.

This is not a common species. It is taken in company with the *plana*, and is generally known as the Plaice.

Massachusetts, STORER.

## *Eyes on the Left Side.*

### PLATESSA OBLONGA, *Dekay.*

### *The American Turbot.*

(PLATE XXXI. FIG. 2.)

*Pleuronectes oblongus, Spotted Flounder*, MITCHILL, Trans. Lit. and Phil. Soc. of N. Y., 1. p. 391.
*Rhombus aquosus, Watery Flounder*, STORER, Bost. Journ. Nat. Hist., 1. p. 351.
" " " " " Report, p. 146.
*Platessa oblonga, Oblong Flounder*, DEKAY, Report, p. 299, pl. 48, fig. 156.
*Platessa ocellaris, Long-toothed Flounder*, DEKAY, Report, p. 300, pl. 47, fig. 152.
*Platessa oblonga*, STORER, Mem. Amer. Acad., New Series, p. 477.
" " " Synopsis, p. 225.

*Color.* Of a reddish-gray color, with more or less numerous circular, oval, or oblong blotches of a darker color, surrounded with a lighter margin, and also numerous white spots, which are distributed more especially at the bases of, and upon, the fins. The dorsal fin is of a lighter color than the body of the fish; its lower portion is reddish; the upper part of a leaden color; and frequently the entire fin is sprinkled with minute white spots; the extremities of the rays are tipped with white. The pectorals are transversely barred with black and white bands, and have a white blotch at their inferior base. The ventrals are light, with darker spots. The anal is similar in its color to the dorsal. The orbits, space in front of the eyes, and the jaws, are spotted with dull blue. Pupils black, irides golden. Right side of fish colorless.

*Description.* Body elongated, with very small, perfectly smooth scales. The depth of the body across the middle, exclusive of the fins, less than one third the length of the fish. The length of the head is rather less than one fourth the entire length of the fish. The top of the head in front of the eyes, the lower jaw, and the intermaxillaries, are perfectly smooth. The eyes are oblong, moderate in size: the upper eye is slightly back of the inferior, in a vertical line; distance between the eyes equal to the longest diameter of the eye. The mouth is situated obliquely; its gape is very large; when closed, the upper jaw projects very slightly in front of the lower; the jaws are armed with a single row of separated, quite large, sharp teeth, the front ones much the largest. A protuberance at the chin. The nostrils are double; the anterior has at its posterior edge a tubular membrane.

The lateral line, commencing in front of the posterior angle of the operculum, makes a high arch over the pectorals, and terminates in a straight line which begins at the posterior extremity of these fins; the top of this arch is a distance nearly equal to one third the length of the head above this straight line.

The dorsal fin arises on a line with the origin of the orbit of the upper eye, and extends to the fleshy portion of the tail. The extremities of the rays are free. The first rays are quite short; those at the middle and towards the posterior portion the longest; the most posterior are the shortest rays of the fin.

The pectorals are rounded when expanded.

The ventrals are very small, half the height of the pectorals; their extremities are free.

The anal fin arises just back of the origin of the ventrals, and terminates on a line with the dorsal, to which it is similar in form.

The caudal fin is large and fleshy, equal in height to the pectorals. The depth of the fleshy portion of the tail at the termination of the dorsal fin is equal in length to the caudal rays. The rays are deeply bifid. When this fin is expanded, it is rounded at its posterior extremity; when not expanded, it is convex, sometimes almost acutely pointed at its posterior centre.

The fin rays are as follows: — D. 89. P. 12. V. 6. A. 74. C. 16.

Length, fifteen to thirty inches.

*Remarks.* The species above described must, I think, be considered the *Platessa oblonga*, and also the *Platessa ocellaris* of Dekay. This conclusion, I conceive, is inevitable upon an examination of Dekay's descriptions and figures. A few observations upon this point may serve to settle the matter. The specimen before me has ocellated spots upon its surface, an angulated caudal fin, a prominence at the chin, and less than ninety dorsal rays.

The ocellated spots would show it to be the *P. ocellaris.* But that species, according to Dekay, has a rounded caudal fin, more than ninety dorsal rays, and a prominent chin.

The angulated caudal fin, and number of dorsal rays (less than ninety), would point it out as the *P. oblonga.* But Dr. Dekay would lead us to infer that there were never ocelli. He says, this species "is nearly uniform brown; occasionally with spots." As I have seen numbers of this species in the market at a time, they present the following characters. Some have distinct ocelli distributed over the greater portion of the body; while in others they are so dim as scarcely to be observed at all. They all have the chin prominent. They all have an angular tail when unexpanded, which is rounded when fully expanded. I have counted eighty-eight, eighty-nine, ninety, ninety-one rays in the first dorsal fin. The two species of Dekay would thus appear identical.

In a specimen I received from Provincetown, in August, 1844, both sides of the fish were equally dark-colored; the upper eye was situated directly upon the top of

the head; back of this eye was a deep notch, upon the upper edge of which, at its anterior angle, commenced the dorsal fin, as shown in the figure. (Fig. 2. b.)

This species is quite common during the summer and early part of autumn at Provincetown, and as far up the Cape as Wellfleet. It is taken along shore in very shallow water, and frequently weighs from fifteen to twenty pounds. At Provincetown it is known as the *Plaice*, in Boston market it is called the Turbot. It is an excellent fish, and is considered by judges to be fully equal to the *Rhombus maximus*, English turbot. For quite a number of years a few specimens had occasionally been yearly brought to our market, when Captain Atwood, about the year 1841, conceived the project of bringing them alive, by the cargo, in the well of his smack. For three years he succeeded quite well in disposing of several loads in this manner, — some being bought, by those who knew their value, as turbot, and others as young halibut. When, however, in the year 1844, the fishermen commenced packing in ice halibut taken upon George's Banks, and were thus enabled to keep the market supplied with that species in a state of perfect preservation, the species we are considering could not be sold. In the latter part of 1847, Captain Atwood brought to Boston a smack load of most excellent turbot, alive, and sold but two hundred-weight, — the remainder died upon his hands, — while species of infinitely inferior quality met with a ready sale in the market.

Massachusetts, STORER. New York, MITCHILL, DEKAY.

### PLATESSA QUADROCELLATA, *Storer.*

### *The Four-spotted Flounder.*

(PLATE XXXI. FIG. 3.)

*Platessa quadrocellata*, STORER, Proceed. of Bost. Soc. Nat. Hist., II. p. 242, 1847.

*Color.* When just taken, the left side of this species is of a gray color, thickly spotted with brown, so as to appear almost confluent, including all of the fins. Upon the posterior half of the body, just beneath the dorsal fin, and directly opposite this, above the anal fin, are situated two large, nearly black ocelli, surrounded by a pinkish halo; at the base of the caudal fin are two similar, smaller ocelli.

*Description.* Body elongated. The greatest depth of the body, exclusive of the dorsal and anal fins, is just back of the posterior extremities of the pectorals. The length of the head is not quite equal to one fourth the length of the entire fish. The eyes are prominent, oblong, situated over each other, separated by a prominent, smooth, bony ridge; their longest diameter is about equal to one sixth the

length of the head. The upper jaw projects beyond the lower when the jaws are closed. The upper jaw has four or five prominent teeth in its front, and numerous card-like teeth towards its angles; in the lower jaw there are from seven to ten teeth on each side. The chin is prominent. The posterior nostril is the larger.

The lateral line curves over the pectorals to their posterior extremity, then pursues a strait course to the tail, and is lost on the central caudal ray.

The dorsal fin commences over the anterior superior angle of the eye, and its rays gradually become higher, until, having reached their highest point just back of the centre of the fin, they gradually diminish in height, and terminate rather abruptly at the fleshy portion of the caudal fin.

The moderate-sized pectorals are situated just beneath the posterior angle of the operculum.

The ventrals are small, broad, and stout.

The anal fin commences just back of the base of the pectorals, and terminates on a line with the termination of the dorsal fin.

The caudal fin is large and angulated, with stout rays.

The fin rays are as follows: — D. 86. P. 10. V. 6. A. 76. C. 17.

Length, twelve to sixteen inches.

*Remarks.* Captain Atwood informed me that he never noticed this species previous to the year 1846. During a visit to Long Point, Provincetown, in the latter part of June, 1847, I observed numerous specimens there. I have seen a single specimen having both sides dark-colored, — and both bearing the peculiarly marked ocelli, — with the exception of the head, which was, as usual, colorless beneath.

Massachusetts, STORER.

## GENUS III. PLEURONECTES, DEKAY. (RHOMBUS OF CUVIER.)

Eyes and colored surface on the left. Teeth in the jaws and pharynx. Dorsal fin commences anterior to the eye.

### PLEURONECTES MACULATUS, *Mitchill.*

(PLATE XXXI. FIG. 4.)

*Pleuronectes maculatus, New York Plaice,* MITCH., Report in part, p. 9.
*Pleuronectes aquosus, Plaice of New York,* MITCH., Trans. Lit. and Phil. Soc. of New York, I. p. 389, pl. 2, fig. 3.
*Rhombus aquosus,* CUVIER, Règne Animal.
*Pleuronectes maculatus, Spotted Turbot,* DEKAY, Report, p. 301, pl. 47, fig. 151.
" " STORER, Mem. Amer. Acad., New Series, II. p. 479.
" " " Synopsis, p. 227.

*Color.* The living fish is of a greenish-brown color above, with small darker

green irregularly formed blotches, and dotted with a great number of minute white spots resembling snow-flakes, the spots near the back being the largest. The fins are of the color of the body. The rays of the pectoral fins are regularly spotted, and present the appearance of bands; their connecting membrane is perfectly colorless and transparent. The pupils are black, the irides golden.

*Description.* Body nearly orbicular, translucent. The scales are very small and round. The greatest depth of the body, exclusive of the fins, is rather less than half of its length. The length of the head is less than one fifth its entire length. The eyes are moderate in size: the inferior is anterior. The mouth is protractile; both of the jaws are furnished with a row of minute, sharp teeth; a patch of similar teeth are situated on the vomer. The nostrils are large, the anterior tubular: on the left, or colored side of the fish, the posterior nostril is just above the anterior angle of the inferior eye, and the anterior nostril is on a line before this. On the right, or colorless side, the nostrils are just below the origin of the dorsal fin.

The lateral line makes a high arch over the pectorals, whence it pursues a straight course to the caudal rays.

The dorsal fin commences on a line with the anterior nostril, above it, and is continued to the fleshy portion of the tail. The ten or twelve first rays of the dorsal fin are fleshy at their bases, and bifurcated just above their bases, and are again subdivided into delicate slips or filaments, which make them appear at first sight as if torn. The rays gradually become higher towards the centre of this fin, and again diminish as they approach the tail. This fin is rounded when expanded; the tips of the rays project just beyond the connecting membrane.

The pectorals are situated just beneath the posterior angle of the operculum; they are fan-shaped and transparent; their rays are bifid.

The ventrals arise at the angle of the lower jaw; the first ray is bifid, and its bifurcations are branched as in the first rays of the dorsal. The remaining rays are merely bifid at their tips.

The anus is situated at the posterior extremity of the ventrals.

The anal fin commences directly back of the anus. It is similar in its form to that of the dorsal, and is coterminal with that fin.

The caudal fin, which is rounded when expanded, is composed of strong, broad, bifid rays.

The fin rays are scaled, with the exception of the ventrals and the anterior rays of the dorsal and anal fins.

The fin rays are as follows: — D. 67. P. 10. V. 10. A. 51. C. $16\frac{2}{2}$.

Length, twelve to eighteen inches.

*Remarks.* When my "Report on the Fishes of Massachusetts" was published, I had never seen a specimen of this species. In August, 1845, Captain Atwood sent me a specimen from Provincetown; and in the following November I received one from the late Dr. Yale, from Holmes's Hole. While visiting Provincetown, in the summer of 1847, I saw this fish swimming about in considerable numbers, in shallow water, with the *Platessa oblonga* and *plana*. It is not used there as an article of food, although Dekay informs us that in New York it is considered a delicate fish.

Massachusetts, STORER. New York, MITCHILL, DEKAY.

## GENUS IV. ACHIRUS, LACEPEDE.

Destitute of pectoral fins. Both eyes and color on the right side. Mouth distorted to the side opposite the eyes. Dorsal and anal extend to the tail, but are not united with it.

### ACHIRUS MOLLIS, *Cuv.*

### *The New York Sole.*

(PLATE XXXII. FIG. 1. *b.* Left Side of Head.)

*Pleuronectes mollis, New York Sole,* MITCH., Trans. Lit. and Phil. Soc. of N. Y., I. p. 388, pl. 2, fig. 4.
*Achirus mollis,* GRIFFITH'S CUV., X. p. 499.
" " STORER, Report, p. 149.
" " DEKAY, Report, p. 303, pl. 49, fig. 159.
" " STORER, Mem. Amer. Acad., New Series, II. p. 480.
" " " Synopsis, p. 228.

*Color.* Upon the right side of a dark brown, marked transversely with rather indistinct, irregular, interrupted black bands; the left side is of a dirty white, with nearly circular dark brown blotches scattered over its entire surface, and also in a less marked manner upon the fins.

*Description.* Body oval. Length of the body, exclusive of the tail, four inches six lines; entire length, six inches; depth of the body two inches back of the snout, three inches, exclusive of the dorsal and anal fins. The length of the head is equal to nearly one fifth the length of the body. The eyes are small, circular, protuberant, and placed directly over each other. Directly in front of the upper eye, and in a line with it, just back of the commencement of the dorsal fin, almost entirely concealed, is a strong, compressed spine, two thirds of a line in length. The mouth is small, with minute teeth in both jaws on the under side; on the left side the aperture is partially concealed by the upper lip. The nostrils are large. The scales on

the body are quite small; on the lower anterior portion of the operculum, on the back just above the eyes, and on the fin-rays, they are larger. The left side is also scaly. The left side of the head is covered with soft filaments, which are continued along the base of the dorsal fin for an inch or more.

The lateral line commences just above the operculum, and is continued in a straight course to the base of the caudal rays.

The dorsal fin commences at the very anterior extremity of the back, which projects slightly beyond the upper jaw, and is continued to the tail, but not united to it.

The ventrals are situated just in front of the anal fin.

The anal fin commences in front of the posterior angle of the operculum, and terminates opposite the dorsal fin.

The caudal fin is nearly one third longer than its width at the base.

The rays of each fin are covered by scales on both sides.

The fin rays are as follows: — D. 55. V. 4. A. 38. C. 13. In a second specimen they were as follows: — D. 52. V. 4. A. 40. C. 16.

Length, six inches.

*Remarks.* Although Dr. Dekay speaks of this species as being common in the waters of New York, it must rarely be found in Massachusetts. In December, 1837, Dr. Yale, of Holmes's Hole, sent me a specimen which had been just taken in Tashmou Pond, about a mile from the village of Holmes's Hole. This pond is separated from the sea by a narrow beach, which is dry a portion of the year. Although Dr. Yale had resided many years at Holmes's Hole, and had a great fondness for natural history, he had never seen another specimen of this fish. In April, 1840, I received a specimen taken at Nahant. In January, 1847, Professor Agassiz procured two specimens in Boston market, which had been taken near Boston, in Charles River. Both Mitchill and Dekay consider this a very delicate fish for the table.

Massachusetts, north of Cape Cod, Storer. Nantucket to Carolina, Dekay.

## FAMILY XX. CYCLOPTERIDÆ.

Ventrals suspended all around the pelvis, and united by a single membrane, forming an oval and concave disk, which the fish employs as a sucker to fix itself to the rocks. Mouth broad, furnished at the jaws and pharyngeals with small pointed teeth; opercula small. Branchial rays six. Pectorals very ample, and almost uniting under the throat, as it were to embrace the disk of the ventrals.

## GENUS LUMPUS, Cuv.

Two dorsal fins; the first dorsal fin so enveloped by a thick and tubercular skin, that, externally, it might be taken for a simple hump of the back; second dorsal with branched rays, opposite the anal. Body deep and rough, with conical horny tubercles.

### Lumpus Anglorum, *Willoughby.*

### *The Lump-Fish.*

(Plate XXXII. Fig. 2.)

*Cyclopterus lumpus*, Lin., Syst. Nat., i. p. 414.
" " *Lump*, Bloch, iii. p. 92, pl. 90.
*Lumpus Anglorum*, Willoughby, p. 208, No. ii.
*Cyclopterus lumpus*, *Lump-Sucker*, Penn., Brit. Zoöl., iii. p. 176, pl. 24.
" " Shaw, Gen. Zoöl., v. p. 388, pl. 166.
" " *Common Lump-fish*, Jenyns, Brit. Vert., p. 471.
" " *Lump*, Rich., Faun. Boreal. Americ., iii. p. 260.
" " Fabricius, Faun. Grœnlandica, p. 131.
" " *Lump-Sucker*, Yarrell, Brit. Fishes, 2d edit., ii. p. 365, fig.
*Cyclopterus cæruleus*, *Blue Lump-fish*, Mitch., Trans. Lit and Phil. Soc. of N. Y., i. p 480, pl. 2, fig. 7.
*Lumpus vulgaris*, Cuv., Règne Animal, ii.
" " *Lump-Sucker*, Storer, Report, p. 151.
*Lumpus Anglorum*, *Lump-Sucker*, Dekay, Report, p. 305, pl. 54, fig. 175.
" " Storer, Mem. Amer. Acad., New Series, ii. p. 481.
" " " Synopsis, p. 229.

*Color.* All the upper part of the body is of a bluish-slate color; the sides and abdomen are of a yellowish-green. The immature fish is blue above, and almost entirely white beneath. Lips yellow.

*Description.* The body is suborbicular, compressed at its upper part. The entire surface of the fish is covered with an immense number of small stellated tubercles, studding, in the adults, even the rays of all the fins. Three rows of tubercles, much larger than those which are universally distributed over the fish, and terminating at their apices in naked spines, are observed projecting from either side. One row, commencing at the upper anterior angle of the eye, curves slightly over the humeral bones, and then passes in nearly a straight line to the tail; a second row, composed of much larger, wider, and more prominent tubercles, commences just beneath the posterior angle of the operculum, and terminates on the same plane with the extremity of the first row, the tubercles having diminished in size as they approached the tail, as in the first row; a third row, composed of a small number of still larger tubercles, commences on a line with the posterior portion of the ventral disk, and terminates just in front of the anal fin, forming the outer boundary of the abdomen. The two upper rows of tubercles are of the color of the back; the lower row is colored like

the abdomen. The tubercles of all these rows are granulated upon their sides, and have a naked spine at their summit. The greatest depth of the fish is equal to more than one half its length. The length of the head is less than one quarter the length of the fish. The head is covered with tubercles similar to those of the body; those on the posterior inferior angle of the operculum are larger than those on the other parts of the head. The eyes are circular; their diameter is equal to less than one third the distance between the eyes. The nostrils are large, tubular. The teeth are sharp and compact. A greater number of rows are in the upper than in the lower jaw; two small patches of minute teeth above and below in the pharynx. Just back of the top of the head, a compressed ridge rises abruptly and curves upward and backward to the posterior half of the body; its depth in the middle being equal to one third of its length; and its length equal to one third the length of the body of the fish. This ridge is formed of eight rays, which are perfectly distinct when the fish is dissected, and readily distinguished also in the dried specimen. The top of this ridge is covered with tubercles precisely similar to those which compose the middle row on the body; directly back of this dorsal ridge is a small flat surface composing the space between it and the dorsal fin, whose sides are armed with strong, prominent tubercles.

The dorsal fin, which is rounded, and one sixth longer than high, with rays multifid, is situated directly behind the flat surface just referred to.

The pectorals are longer at their base than the height of their highest rays; the height of the inferior rays is equal to about one fifth the height of the longest; these fins are rounded when expanded.

The ventrals, together with the anterior portion of the pectorals, form an oblong disk, of a bright yellow color, with six well-marked lines on each side of its centre, by which it is enabled to attach itself very powerfully to foreign substances.

The anal fin, commencing about on a line opposite the beginning of the dorsal, terminates on the same plane with that fin.

The caudal fin, when not expanded, is a little higher than wide; when expanded, it is one quarter wider than high. The depth of this fin at its base to its extremities when expanded is as two to five.

The fin rays are as follows: — D. 10. P. 20. A. 10. C. 12.

Length, eight to twenty inches.

*Remarks.* The whole appearance of this fish is very forbidding, being in young specimens a soft, gelatinous, tremulous mass; in older specimens it is of a much firmer consistence; but in both it is covered entirely with firm, horny spines.

This not uncommon species in Massachusetts Bay is frequently seen after severe storms thrown upon our beaches. Occasionally it is taken while fishing for cod, with the hook; and it is also caught in nets set for menhaden; generally, however, it is found attached to sea-weed and other substances floating near the shore.

Richardson tells us that "the Greenlanders eat its flesh, either cooked or dried, and its skin raw, throwing away only the tubercles"; and Dr. Neal observes, "that it is purchased at Edinburgh for the table." With us, however, it is not used as an article of food. The common weights of this fish are from three to four pounds, and from six to twelve pounds. The largest specimen I have met with was taken in January, 1843, and weighed eighteen pounds and three quarters.

Greenland, FABRICIUS. Maine, Massachusetts, STORER. New York, MITCHILL, DEKAY.

## FAMILY XXI. ECHENEIDÆ.

With a flattened disk upon the top of the head, composed of numerous cartilaginous transverse plates, directed obliquely backwards, dentated or spinous at their posterior edge, and movable, by means of which they are enabled to attach themselves to other substances.

### GENUS ECHENEIS, LIN.

Body elongated, covered with very small scales. A single dorsal fin, placed opposite the anal. Head very flat, covered with a disk; mouth wide, with numerous small, recurved teeth on both jaws, tongue, and vomer.

### ECHENEIS ALBICAUDA, *Mitchill.*

### *The White-tailed Remora.*

(PLATE XXXII. FIG. 3.)

*Echeneis albicauda, White-tailed Remora*, MITCHILL, Amer. Monthly Magazine, II. p. 244.
*Echeneis naucrates, The Indian Remora*, STORER, Report, p. 153.
*Echeneis albicauda, White-tailed Remora*, DEKAY, Report, p. 307, pl. 54, fig. 177.
" " " " STORER, Bost. Journ. Nat. Hist., IV. p. 183.
" " " " " Mem. Amer. Acad., New Series, II. p. 483.
" " " " " Synopsis, p. 231.

*Color.* Above, of a grayish-slate color; lighter upon the sides, with a dark band, which, commencing at the tip of the lower jaw as a small black point, runs along its margin to the angle of the jaw, where it expands to a band which passes to the tail, interrupted only by the eyes; in front of the pectorals this band is only two

lines in width, at the pectorals it grows wider, is widest beneath them, and becomes gradually smaller as it approaches the posterior extremity of the fish. The first ray of the dorsal fin is margined with white. The pectorals are the color of the body. The anal fin is dark-colored, edged with white. The upper and lower extremities of the caudal fin are white.

*Description.* Body cylindrical, elongated. The greatest depth of the body, exclusive of the fins, is equal to one tenth its length. The length of the head, from the tip of the lower jaw to the posterior angle of the operculum, is equal to about one seventh the entire length of the fish; the depth of the head at the posterior portion is equal to half of its length; its width over the same portion is equal to one third of its length. The top of the head is flattened; the body between the disk and the dorsal fin is nearly circular; back of the dorsal fin it is somewhat compressed. Upon the top of the head is an adhesive disk, about one fifth the length of the body, at its anterior extremity equal in width to about one third the length of the head; the widest part of the posterior extremity is slightly greater. This disk extends from the tip of the upper jaw to the middle of the pectorals; it has twenty-one light-colored transverse plates, divided by a longitudinal median fleshy line; the entire disk is margined by a fleshy border from one to four lines wide. The eyes are situated half-way between the tip of the lower jaw and the extremity of the operculum; they are circular, and between three and four lines in diameter. The nostrils are double, with fleshy appendages. The jaws are crowded with numerous small, card-like teeth. Teeth also are observed in the throat and upon the palatine bones. The lower jaw terminates in a point in advance of the upper.

The dorsal fin arises just anterior to the middle of the body. It is rather more than one third the length of the fish. It is of a dark slate color; the tips of the anterior rays are edged with white.

The pectorals commence on a line with the posterior fifth of the disk; their depth to their length is as one to three.

The ventrals are situated just posterior to the pectorals; their depth is equal to one sixth their length.

The anal fin arises directly opposite, and terminates upon the same plane as the dorsal. Its anterior rays are higher than those of that fin. The anus is half an inch in front of this fin.

The caudal fin is nearly even at its extremity.

The fin rays are as follows: — D. 29. P. 18. V. 5. A. 30. C. 18.

Length, twenty inches.

*Remarks.* This species is exceedingly rare in our waters; the specimen from which my description was drawn up, in my "Report on the Fishes of Massachusetts," was taken from the bottom of a fishing-smack, to which it was attached, in Boston Bay.

Massachusetts, STORER. New York, MITCHILL, DEKAY.

## ECHENEIS QUATUORDECIMLAMINATUS, *Storer.*

### *The Fourteen-plated Remora.*

(PLATE XXXII. FIG. 4.)

*Echeneis quatuordecimlaminatus, Fourteen-plated Remora*, STORER, Report, p. 155.
" " " " an juv.? DEKAY, Report, p. 309.
" " STORER, Mem. Amer. Acad., New Series, II. p. 484.
" " " Synopsis, p. 232.

*Color.* Of a light reddish-brown color, rather darker beneath. The pectoral and ventral fins are a little lighter than the body. The dorsal and anal fins are clouded with a lighter tint.

*Description.* Body fusiform, elongated. The length of the head is less than one fifth the length of the entire fish: above, it is entirely covered by an adhesive disk, which commences at the tip of the upper jaw, and, extending on each side to the eyes, terminates on a plane with the posterior half of the pectorals: this disk is surrounded by a fleshy margin, which is tipped with a darker brown than the color of the body, and is divided in its centre by a longitudinal fleshy septum, on each side of which are fourteen or fifteen distinct, strongly serrated laminæ. The gill-covers are large; the lower jaw projects beyond the upper; the jaws are armed with several rows of strong, sharp, recurved teeth; teeth also are observed upon the pharynx, the palatine bones, and the root of the tongue. The gape of the mouth is moderate in size. The eyes are horizontally oval. The nostrils, which are near the edge of the upper jaw, are double.

The lateral line commences at the origin of the pectorals above, and, making a slight curve from their extremities, is continued in a straight course to the tail.

The dorsal fin commences about the middle of the length of the fish: it is rounded anteriorly, gradually diminishes in height as it approaches the tail, and terminates posteriorly above in a point.

The pectorals are somewhat rounded at their extremities.

The ventrals are narrow and triangular; and are attached to the belly by a membrane extending from the inner ray; the rays are multifid.

The anal fin commences a short distance back of the dorsal, is of a form somewhat similar to that fin, and terminates upon the same plane with it.

The caudal fin, composed of stout fleshy rays, is nearly straight at its posterior extremity. The distance between the extremities of the outer rays is equal to the height of those rays.

The fin rays are as follows: — D. 32. P. 22 – 24. V. 5. A. 28 – 30. C. 18.

Length, seven and a half inches.

*Remarks.* This may be an immature fish which I have described; but I think it must be a new species. According to Dekay, three species of Remora are observed upon the coast of New York, the Albicauda, Naucrates, and Remora. I think it cannot be one of these species. It has not the broad longitudinal band, nor the white tips at the extremities of the caudal fin, noticed in the Albicauda, nor has it the twenty or twenty-three plates observed in the disk of that species. From the Naucrates it differs in its color, and the number of plates in the disk.

In the Remora the disk extends to the end of the pectorals; in this species it terminates at the commencement of the posterior half of these fins. In this species the dorsal and anal fins are not coequal; the dorsal fin of the Remora has twenty-one rays, while in this species it has thirty-two; the anal fin in the Remora contains twenty rays, the same fin in this species has twenty-eight rays. The caudal fin of the Remora is crescent-shaped.

I have seen but two specimens of this species. One of these was received from the late Dr. Yale, of Holmes's Hole, and served for the description contained in my "Report." The other was taken at Wellfleet, in August, 1844. One of these measured five inches and a half, and the other seven inches and a half.

## APODES.

No ventral fins.

### FAMILY XXII. ANGUILLIDÆ.

Body very much elongated and cylindrical, for the most part of a serpentine figure. Scales scarcely apparent, being imbedded in a soft and thick skin. Air-bladder of various singular forms. No cœcal appendages.

## GENUS I. ANGUILLA, Cuv.

The dorsal commencing considerably behind the pectorals, and uniting with the anal to form the caudal. Lower jaw the longer. Mouth with a row of teeth in each jaw, and a few on the anterior part of the vomer.

### Anguilla Bostoniensis, *Dekay.*

### *The Common Eel of Massachusetts.*

(Plate XXXIII. Fig. 1.)

*Anguilla vulgaris, Common Eel,* Mitch., Trans. Lit. and Phil. Soc. of N. Y., i. p. 360.
" " *Fresh-water Eel,* Mitch., Amer. Month. Mag., ii. p. 242.
*Murœna Bostoniensis,* Lesueur, Journ. Acad. Nat. Scien., i. p. 81.
" " *Common Eel of Massachusetts,* Storer, Report, p. 158.
*Anguilla tenuirostris, Common Eel of New York,* Dekay, Report, p. 310, pl. 53, fig. 173.
*Anguilla Bostoniensis* (Lesueur), Dekay, Report, p. 313.
" " Ayres, Bost. Journ. Nat. Hist., iv. p. 279.
" " Storer, Mem. Amer. Acad., New Series, ii. p. 485.
" " " Synopsis, p. 233.

*Color.* This species is of a greenish or olive-brown above, and yellowish or yellowish-white beneath; frequently a reddish tinge is noticed along the margin of the anal fin. In the smaller specimens, the opercula, throat, and abdomen anterior to the vent, are of a bluish slate color, with scarcely a tint of yellow. The dorsal fin is of the same color as the back.

*Description.* Body cylindrical, compressed posteriorly, terminating in a point. The head is equal to about one tenth the length of the body, compressed above, tapering to a blunt point at the snout; the distance across the occiput is equal to about half the length of the head. The lower jaw slightly projects; both jaws are furnished with several rows of small, incurved, card-like teeth. The lips are fleshy. The vertical gape of the mouth is equal to half the length of the head. The eyes, situated just above and anterior to the angle of the jaw, are equal to one eighth the length of the head. The posterior nostrils, which are oval, are situated directly in advance of the superior anterior angle of the eye. A small tubular cirrhus projects forwards from the anterior nostrils situated on each side of the snout. A line of mucous pores are observed between the anterior and posterior nostrils, and another series pass backwards to the posterior inferior angle of the eye.

The lateral line commences above and in front of the pectoral fin, and pursues a straight course to the very extremity of the fleshy portion of the tail.

The dorsal fin arises on the anterior half of the body, and is continued to the

caudal fin, which is again connected with the anal; the three forming one continuous fin. The widest portions of these fins are at a short distance in front of their posterior termination. The number of rays in these united fins is about four hundred and fifty-five.

The anus is small, and situated just anterior to the anal fin.

The pectorals are directly back of the branchial aperture; they are somewhat rounded at their extremities, and are composed of sixteen rays.

Length, twenty-four to thirty-four inches.

*Remarks.* Dr. Mitchill, in his paper on the "Fishes of New York," published in 1815, briefly refers to this species, which he incorrectly considered the *Anguilla vulgaris*, Bloch. Lesueur, in the first volume of the "Journal of the Academy of Natural Sciences of Philadelphia," published in 1817, describes it as a new species, with sufficient accuracy to be readily distinguished, under the name of *Muræna Bostoniensis.* Subsequently, in February, 1818, Dr. Mitchill minutely and clearly described it as the *Anguilla vulgaris.* In my "Report on the Fishes of Massachusetts," I included it under the name given it by him who first knew it to be, and described it as, a new species. Dr. Dekay has since called it *Anguilla tenuirostris.*

In my "Report," &c., I included a species which I supposed to be the *argentea* of Lesueur. This was also contained in my "Synopsis of the Fishes of North America." In October, 1845, my friend, the late Dr. Yale, sent me a living specimen of this fish from Holmes's Hole, where it is called the Neshaw eel. I carefully compared this specimen with the *A. Bostoniensis*, and could not perceive characteristics sufficiently well marked to make them distinct species. The color of the Neshaw eel is rather more of a brown than greenish, and the abdomen is destitute of the yellowish tinge possessed in the common specimens in the market; but these differences may be dependent upon its locality. Dr. Yale writes: "The Neshaw eel is taken in all the ponds and lagoons connected with the sea on the Vineyard; and are taken in October and November in pots while making their way from the ponds to the sea. It is said, that, when the openings from the ponds are closed, they pass over the sand in the night."

The common eel of Massachusetts is taken along our entire coast, as well as in the rivers and ponds of the State. At some seasons, spring and winter, for instance, great numbers are brought to market from the mouths of the neighboring rivers, upon the muddy bottoms of which they live. They meet with a ready sale. So great is the demand sometimes that it cannot be answered. During the winter this species is speared, holes being cut through the ice for this purpose. In spring the

markets are usually supplied from the rivers, where they are taken in nets. At Medford nets are stretched across the river, having in their middle a large bag capable of containing from fifteen to twenty bushels; as the eels are going up or down the river they are caught, and are kept alive for the supply of the market in large ditches, excavated near the river, which are supplied by the tide-water. About three thousand pounds are yearly taken at Watertown. Those taken in summer, when they are able to procure the britt, and other fishes upon which they feed, are much the larger and richer, weighing from one to nine pounds. In October, 1844, I saw an individual measuring two feet and ten inches in length, and weighing three pounds and a half, which was taken in Medford River, which agreed in its measurements with the one I have above described, and was, I suppose, a mere variety, although it was of a dark olive-brown above, and of a slate color beneath, without the slightest tint of yellow, and a very slight tinge of red along the anal fin. The fishermen suppose this peculiarity of color, which it appears they occasionally see, is owing to their being confined entirely to fresh water, and never having visited the sea.

Massachusetts, LESUEUR, STORER. Connecticut, LINSLEY. New York, MITCHILL, DEKAY.

## GENUS II. AMMODYTES, LINN.

Head and body elongated; gill-openings large; dorsal fin extending nearly the whole length of the back; anal fin of considerable length; dorsal and anal fins separated from the caudal fin. Lower jaw longest. Their stomach is pointed and fleshy; they have neither cœca nor natatory bladder.

### AMMODYTES AMERICANUS, *Dekay.*

### *Sand-Eel.*

(PLATE XXXIII. FIG. 2.)

*Ammodytes tobianus, Sand-Launce,* BLOCH, MITCH., Trans. Lit. and Phil. Soc. of N. Y., I. p. 363.
" " *Sand-Eel,* STORER, Report, p. 159.
*Ammodytes Americanus, American Sand-Launce,* DEKAY, Report, p. 317, pl. 52, fig. 167.
*Ammodytes lancea,* AYRES, Bost. Journ. Nat. Hist., IV. p. 280.
*Ammodytes tobianus, Little Sand-Eel,* LINSLEY, Cat. of Fishes of Connecticut.
*Ammodytes lancea, Banded Sand-Launce,* " " "
*Ammodytes Americanus,* STORER, Mem. Amer. Acad., New Series, II. p. 489.
" " " Synopsis, p. 237.

*Color.* Of a dirty greenish-brown color upon the back; the sides and abdomen are silvery; the top of the head is flesh-colored; the preopercles are silvery; the opercula are cupreous and silvery. The pupils are black, the irides silvery.

*Description.* Body elongated, slightly compressed. Head pointed at snout. The length of the head, from the extremity of the snout to the end of the gill-covers, is more than one fifth the length of the entire fish. The lower jaw projects beyond the upper, and terminates in a conical tip. From the anterior inferior portion of the operculum, a few slight striæ pass obliquely upwards, backwards, and downwards to its posterior margin. The nostrils are double, and are situated half-way between the eyes and the snout. The eyes are circular; the diameter of the eye is equal to one ninth the length of the head.

The lateral line is straight and indented.

The very delicate dorsal fin commences on a line with the end of the pectorals, and terminates at the fleshy base of the caudal fin. This fin is rather highest just posterior to its centre. When unexpanded, it is received into a groove at its base.

The pectorals are one third the length of the head. From their base a slight membrane extends posteriorly on each side of the abdomen.

The anal fin, which is about as high as the dorsal fin and terminates posteriorly on a line with it, is just one third the length of the entire body.

The caudal fin is forked.

The fin rays are as follows: — D. 61. P. 13. A. 28. C. 14.

Length, six to twelve inches.

*Remarks.* This species, which is generally known among fishermen as the "Sand-Eel," is found plentifully at Holmes's Hole, and it oftentimes collects at Provincetown in myriads. In June, 1847, while on a visit at this latter place, I observed the shores were lined with these fishes, which were left by the refluent tide. Captain Atwood assured me that the waters around Longpoint were at times so densely crowded with them, as to seem literally alive. In a letter to me, dated June 18th, 1847, he says, while speaking of this species: "Last Friday night they ran ashore in such quantities, that they covered the ground from one to two inches deep, and when the water covered the flats the whole bottom looked like an immense sheet of silver."

When thus situated they are readily devoured by their enemies, among whom are the cuttle-fish.

Banks of Newfoundland, H. R. Storer. Massachusetts, Storer. Connecticut, Ayres, Linsley. New York, Mitchill, Dekay.

## LOPHOBRANCHII.

Gills, instead of being, as usual, pectiniform, are divided into little round tufts, dispersed in pairs along the branchial arches.

## FAMILY XXIII. SYNGNATHIDÆ.

Body mailed with transverse angular plates. Opercle large; branchial opening very small, and formed by a membrane which only exhibits vestiges of rays. Dorsal single. No cœca; with an air-bladder.

### GENUS I. SYNGNATHUS, Linn.

Body elongated, slender, covered with a series of indurated plates, arranged in parallel lines; head long; both jaws produced, united, tubular; no ventral fins. Males with a pouch for the reception of the female roe.

### Syngnathus Peckianus, *Storer.*

### *Peck's Pipe-fish.*

(Plate XXXIII. Fig. 3.)

*Syngnathus typhle, Smaller Pipe-fish*, Mitchill, Trans. Lit. and Phil. Soc. of N. Y., I. p. 475.
*Syngnathus Peckianus, Peck's Pipe-fish*, Storer, Report, p. 163.
*Syngnathus fuscus, Brown Pipe-fish*, Storer, Report, p. 162.
*Syngnathus fasciatus, Banded Pipe-fish*, Dekay, Report, p. 319, pl. 54, fig. 174.
*Syngnathus viridescens, Green Pipe-fish*, Dekay, Report, p. 321, pl. 54, fig. 176.
*Syngnathus fuscus*, Dekay, Report, p. 321.
*Syngnathus Peckianus* (Storer), Dekay, Report, p. 321.
" " Ayres, Bost. Journ. Nat. Hist., IV. p. 282.
" " Storer, Mem. Amer. Acad., New Series, II. p. 490.
" " " Synopsis, p. 238.

*Color.* A living male specimen presents the following appearances. Of a greenish-brown color above, with several irregular transverse broad dark bands; numerous narrower bands upon the sides of the same color. The upper portion of the operculum is olive-colored; the lower portion is of a golden yellow. The abdomen in front of the anus is golden; the portion just back of the anus is very broad, and contains a flesh-colored membrane, which separates in its centre, forming two flaps; the lower portion of the sides, exterior to this dilated part, is sprinkled with minute white dots; and along this outer edge is a beautiful deep-brown band,

extending its whole length. The inferior portion of the body posterior to the membranous flap is of a pinkish hue. The throat is of a bright yellow color. The pupils of the eyes are black; the irides are coppery. A yellowish-brown band passes downwards and backwards from the posterior angle of the eye to the centre of the operculum. Along the outer edge of the rostrum, from the eye almost to the snout, passes a dark-brown band. The dorsal fin is transparent, and indistinctly longitudinally banded with brown. The pectorals and anal fin are colorless. The caudal fin is wholly brown.

When the fish is preserved in spirits, the colors almost entirely disappear; the band on the outer edge of the abdominal flaps, the transverse bands on the back and sides, and the bands on the rostrum, are scarcely, if at all, perceptible; and the flesh-colored membrane of the pouches becomes of a dull white color.

*Description.* Body elongated, compressed upon the sides, flattened above, and gradually tapering from the head to the tail; its whole surface being covered with horny, striated plates. The depth of the body just back of the pectorals, and also at the anus across, equal to one thirty-sixth its entire length; the width of the body at the anus is equal to half the depth back of the pectorals; the width at the centre of the pouches is equal to the depth back of the pectorals; the length of the pouches is less than one third the length of the fish.

The length of the head, from the extremity of the snout to the posterior angle of the operculum, is equal to one ninth the entire length of the fish. Rostrum tubular, compressed. The lower jaw is rather the longer, and passes obliquely upwards to form the mouth. The eyes are prominent, and very movable in their orbits. The orbitar edges being elevated, a depression is seen between the eyes; in the centre of this depression arises a slight ridge, which is continued upon the top of the rostrum to the tip of the snout; upon the top of the head is situated another ridge which is continued on the neck posterior to the origin of the pectorals. The opercula are pectinated; or of the form of a Pinna, broad posteriorly, rounded beneath and behind, and covered with striæ radiating from their circumference.

The anterior portion of the body is heptangular: on each side of this portion are three ridges, and one upon the abdomen. One of these ridges commences at the posterior superior angle of the operculum, and is continued in a straight line nearly to the termination of the dorsal fin; this ridge forms the lateral boundary of the dorsum.

The second ridge arises beneath the pectorals at their base, and, passing along

the middle of the side of the fish, terminates beneath the centre of the dorsal fin, above the anus.

The third ridge commences below and anterior to the pectoral fins, and, bounding the sides of the abdomen, is continued to the tail. Besides these three ridges on each side, a seventh ridge, commencing at the throat, passes through the centre of the abdomen to the vent. Just above the termination of the second ridge, or that upon the centre of the sides, another ridge commences, which passes backwards to the termination of the first ridge, or that upon the side of the back, then, curving upwards to the sides of the back, takes the place of the first ridge, and is continued to the tail. Back of the vent the abdominal ridge disappears, so that the space between the vent and the termination of the first ridge is hexangular. Back of the dorsal fin, the ridge upon the centre of the sides having disappeared, the body is quadrangular.

In front of the anus are nineteen transverse plates, and in front of the dorsal fin are fourteen of these plates; between the anus and the caudal fin are forty-two of these plates. The portion of the abdomen just back of the vent is much wider than the rest of the body, and presents the membranous flaps, which approach each other at the median line, thus forming pouches or a false belly in which are contained the ova of the female.

The dorsal fin is situated at the commencement of the second third of the body, or at a distance back of the tip of the snout equal to one third the entire length. It is slightly rounded above, and is longer than the head; the height of its rays is equal to about one fifth the length of the head.

The anus is situated directly beneath the middle of the dorsal fin.

The pectorals are rather small, and are rounded when expanded.

The anal fin is exceedingly delicate, scarcely discernible without the aid of a glass.

The caudal fin is fan-shaped when expanded; the extremities of the rays project slightly beyond the connecting membrane.

The fin rays are as follows: — D. 45. P. 14. A. 3. C. 12.

Length, six to twelve inches.

*Remarks.* This species is frequently taken in nets, in the waters of Boston Harbor, by boys, while catching minnows for bait. Its motions are exceedingly rapid, resembling the gyrations of the Colubridæ. In one of the specimens described in my Report, numerous ova contained in its false pouches were hatched soon after it was taken, and when I received it, two days subsequent to its capture, it was

surrounded by one hundred and fifty young, about half an inch long, which, with the exception of several narrow transverse black bands, were nearly colorless. In several others, examined at the same time, their pouches were crowded with ova, or in the act of protruding the young.

The following remarks accompanying my original description of this species may not be considered inappropiate here.

Among the earliest cultivators of Ichthyology in our country no name is more prominent than that of William Dandridge Peck. So early as the year 1794, while residing at the town of Kittery, in Maine, he wrote a clear and accurate "description of four remarkable fishes, taken near the Piscataqua, in New Hampshire." This paper was published in 1804, in the second part of the second volume of the "Memoirs of the American Academy of Arts and Sciences," accompanied with very good figures, when the early period of our country is considered. The manuscript of his Ichthyological Lectures also, afterward delivered by him at Harvard University as Professor of Natural History, and kindly loaned me to examine by my friend Thaddeus William Harris, M. D., Librarian to the University, exhibit no inconsiderable degree of research. As the species described and first published by him as new have, *three of them at least*, been described by other naturalists under other specific names, I feel that I am performing an appropriate duty in connecting the name of our deceased countryman, whose merits have been unjustifiably overlooked, with one of a class of animals whose history he so successfully endeavored to elucidate.

Massachusetts, Storer. Connecticut, Linsley. New York, Mitchill, Dekay.

## GENUS II. HIPPOCAMPUS, Cuv.

The jaws united and tubular, like those of the Syngnathi; mouth placed at the end; body compressed, short, and deep; the whole length of the body and tail divided by longitudinal and transverse ridges, with tubercular points at the angles of intersection; pectoral and dorsal fins; no ventral nor caudal fins; the females only have an anal.

## HIPPOCAMPUS HUDSONIUS, *Dekay.*

### *Short-nosed Sea-Horse.*

(PLATE XXXIII. FIG. 4.)

*Syngnathus hippocampus, Sea-Horse Pipe-fish,* MITCH., Trans. Lit. and Phil. Soc. of N. Y., I. p. 475.
*Hippocampus brevirostris, Short-nosed Sea-Horse,* STORER, Report, p. 167.
*Hippocampus Hudsonius, Hudson River Sea-Horse,* DEKAY, Report, p. 322, pl. 53, fig. 171.
*Hippocampus brevirostris,* LINSLEY, Cat. of Fishes of Connecticut.
*Hippocampus Hudsonius,* STORER, Mem. Amer. Acad., New Series, II. p. 491.
" " " Synopsis, p. 239.

*Color.* Yellowish-brown throughout.

*Description.* Body heptagonal, composed of twelve segments, which are armed on each side with three rows of prominent spines, and a single row of similar spines are noticed beneath. The greatest depth of the body is across from the dorsal fin. The length of the head is more than one fifth the entire length of the fish. The head is compressed upon the opercula and surmounted above by a bony prominence which expands into five points, four lateral and one posterior. Behind this are situated the branchial orifices. A short spine is seen at the base of the snout, in front of the eyes; on each side of this is a minute spine; directly above each eye is a larger spine; and at the posterior angle of the eye is a very short one: beneath the eye, on the throat, are two small ones on each side. The snout is straight and tubular, and measures ten lines to the anterior base of the opercula. The eyes are large. The tail is quadrangular, about half of its entire length; it is divided into thirty-four segments, and gradually terminates in a point.

The dorsal fin is situated upon a slight projection of the dorsum, composed of three segments, at the origin of the tail.

The fin rays, as well as can be determined with the specimen much contracted and otherwise injured by drying, are as follows: — D. 18 or 20. P. 14 or 15. A. 3 or 4.

Length, five inches.

*Remarks.* In my "Report" I described this species from the only specimen I had seen. It was found by Dr. Yale upon the shore at Holmes's Hole, and was sent by him to the cabinet of the Boston Society of Natural History. He observed, in a letter to me, "he never knew one to be taken alive, yet they are frequently found on the shore." The specimen described was a female. As I have seen no specimen since that was noticed, I can only redescribe it, and accompany the description with a figure, which, considering the dried condition of the fish, is quite accurate.

I was undoubtedly in error in considering this species as the *brevirostris*, and with pleasure adopt the specific name of my lamented friend, Dr. Dekay.

Massachusetts, STORER. Connecticut, LINSLEY. New York, MITCHILL, DEKAY.

## PLECTOGNATHI.

The maxillary bone soldered or fixedly attached on the side of the intermaxillary, which alone forms the jaw, and to which the palatine arch is dovetailed by a suture within the cranium, and consequently has no power of motion. Opercula and the rays concealed under a thick skin, which only permits a small branchial cleft to be visible externally.

## FAMILY XXIV. GYMNODONTIDÆ.

Instead of apparent teeth, the jaws are furnished with an ivory substance, divided internally into laminæ, the general appearance of which somewhat resembles the bill of a parrot, and which is essentially composed of true teeth united together, and succeeding one another in proportion as there are any worn out by trituration. Opercula small; their rays five in number.

### GENUS I. TETRODON, LINN.

Jaws divided in the middle by a suture, presenting the appearance of four teeth in front, two above and two below. The skin over a portion of its whole extent covered with prickles.

#### TETRODON TURGIDUS, *Mitchill.*

#### *The Swell-fish. Puffer.*

(PLATE XXXIII. FIG. 5. *b.* Jaws.)

*Tetraodon turgidus, Puffer*, MITCH., Trans. Lit. and Phil. Soc. of N. Y., I. p. 473, pl. 6, fig. 5.
" " *Swell-fish, Puffer*, STORER, Report, p. 169.
" " *Common Puffer*, DEKAY, Report, p. 327, pl. 55, fig. 178.
" " " AYERS, Bost. Soc. Nat. Hist., IV. p. 285.
" " " STORER, Mem. Amer. Acad., New Series, II. p. 493.
" " " " Synopsis, p. 241.

*Color.* Upper part of the body ash-colored, interspersed with light pea-green, with large irregular patches of greenish-brown. Sides orange, with a shade of brown, barred transversely by seven or eight blackish irregularly defined bands. Abdomen yellowish-white. Head greenish-brown. Pupils green, irides orange. Fins color of abdomen.

*Description.* Body oblong, cylindrical, globular when inflated. The whole surface

of the body, save the chin and the space between the dorsal and the caudal fins, and the anal and caudal, roughened by innumerable small spines. The greatest depth of the body when collapsed is one fourth the length of the body; when inflated, its greatest depth is one third the length of the body; the greatest width of the fish is equal to one third its length. The length of the head is nearly one third the length of the body. The eyes are large, and horizontally oval. The distance between the eyes is equal to their longest diameter. The nostrils are situated just in front of the eyes, and are furnished with a fleshy filament. The jaws are stout and equal.

No lateral line is observable.

The fan-shaped dorsal fin arises just in advance of the anal fin. The first ray is the shortest, the third ray the longest of the fin.

The pectorals are subquadrangular.

The anal fin is rather smaller than the dorsal.

The caudal fin is nearly even at its extremity.

The fin rays are as follows: — D. 6 – 8. P. 15. A. 6, 7, 8. C. 6, 7.

Length, six to fourteen inches.

*Remarks.* This species is known by the names of Swell-fish, Bellows-fish, and Puffer, from its power of inflating itself with air. It is found along our entire coast. It is common at Nahant, and is sometimes taken from the bridges leading from Boston. At Manimsha Creek, in Chilmark, it exists in great numbers. When taken with the hook it is collapsed, but almost immediately inflates itself: this inflation is readily induced by scratching its abdomen.

Massachusetts, STORER. Connecticut, LINSLEY, AYRES. New York, MITCHILL, DEKAY.

### TETRODON LÆVIGATUS, *Linn.*

### *The Smooth Puffer.*

(PLATE XXXIV. FIG. 1.)

*Tetraodon lævigatus*, LIN., Syst. Nat., p. 411.
" " SHAW, Gen. Zoöl., v. p. 446.
*Tamboril*, PARRA, p. 37, pl. 19.
*Tetraodon lævigatus, Brown Globe-Fish*, MITCH., Report on the Fishes of New York, p. 28.
*Tetraodon mathematicus, Mathematical Tetraodon*, MITCH., Trans. Lit. and Phil. Soc. of New York, I. p. 474, pl. 6, fig. 6.
" " " " STORER, Supplement to Rep. Bost. Journ. Nat. Hist., IV. p. 183.
*Tetraodon lævigatus, Lineated Puffer*, DEKAY, Report, p. 329, pl. 56, fig. 182.
" " " " STORER, Mem. Amer. Acad., New Series, II. p. 493.
" " " " " Synopsis, p. 241.

*Color.* Of a deep olive-green color above; the sides are silvery; the inferior portion of the body is white. Pupils black, irides golden.

*Description.* Body elongated; anterior portion of the body much the more prominent; abdomen pendulous. The entire surface of the body is perfectly smooth, except the portion below the pectoral fins, posterior to the throat, and anterior to the anus, which is armed with an immense number of small stellated spines.

Several well-marked series of mucous pores are distributed over the surface, which have caused it to receive its common names, in the works of ichthyologists, of *lineated* and *mathematical.* One of these commences about half an inch back of the angle of the jaws; this passes backwards to the posterior extremity of the eye, being a short distance beneath the eye, then ascends obliquely to a point upon the back two inches above the middle of the pectoral fin, then curves downwards to the middle of the side of the fish, to a point about an inch back of the dorsal fin, whence it proceeds in a straight course to the caudal rays. This line from its origin also passes upward and backwards, just exterior to the nostrils, and, curving high up over the eyes, passes back of them and downward to meet the former line about half an inch back of the eyes, thus forming a ring around them. Directly above the base of the pectoral fins, a transverse line crosses from the lateral line on one side to that on the other. From this transverse line, an undulating line passes to the ring around the eyes.

Its greatest depth is less than one sixth its length. Its greatest width is across the base of the pectorals.

The length of the head is equal to about one quarter its entire length. The eyes are oblong. The nostrils are situated a short distance in front of, and rather above, the anterior angle of the eyes. The jaws are very strong. The lips are fleshy and lax.

The trapezoidal dorsal fin is situated upon the posterior half of the body.

The pectoral fins are short and subquadrangular.

The anal fin, of the same form and size of the dorsal, is directly opposite that fin.

The caudal fin is deeply forked.

The fin rays are as follows: — D. 13. P. 16. A. 12. C. 11.

Length, one to two feet.

*Remarks.* The only individual of this species I have seen was taken several years since at Nantucket, and was described by me, from the preserved specimen, in the Boston Journal of Natural History, 1843 – 4.

Massachusetts, Storer. New York, Mitchill, Dekay. South Carolina, Linn. Gulf of Mexico, Parra.

## GENUS II. ORTHAGORISCUS, Schn.

Jaws undivided, forming a cutting edge. Body compressed, without spines, not susceptible of inflation, and with the tail so short, and so high, vertically, that they have the appearance of fishes from which the posterior part has been cut away. Dorsal and anal, each high and pointed, united to the caudal. No natatory bladder; stomach small, and immediately receiving the biliary canal.

### Orthagoriscus mola, *Schn.*

### *The Sun-fish.*

(Plate XXXIV. Fig. 2.)

*Tetraodon mola*, Lin., Syst Nat. p. 412.
" " *Short Tetraodon*, Penn., Brit. Zoöl., iii. p. 172, pl. 22.
*Diodon mola*, Bloch, pl. 128.
*Cephalis brevis, Short Sun-fish*, Shaw, Gen. Zoöl., v. p. 437, pl. 175.
" " " Mitch., Trans. Lit and Phil. Soc. of N. Y., i. p. 471.
*Orthagoriscus mola, Short Sun-fish* (Schneider), Jenyns, Brit. Vert., p. 490.
" " Griffith's Cuv., x. p. 569.
" " *Short Sun-fish*, Yarrell, Brit. Fishes, 2d edit., ii. p. 462, fig.
" " Storer, Report, p. 170, pl. 3, fig. 1.
" " *Short Head-fish*, Dekay, Report, p. 331, pl. 59, fig. 193.
" " Storer, Mem. Amer. Acad., New Series, ii. p. 494.
" " " Synopsis, p. 242.

*Color.* The back is of a dark gray color; the sides of a grayish-brown, with silvery reflections; the abdomen is of a dull, dirty white. A broad, nearly black, band commences at the origin of the dorsal fin, and, running along its base, is continued, in front of the caudal and anal fins, to the anus; this band is lighter-colored along the base of the anal fin, and here it is also narrower, being about the same depth as at the dorsal; but along the base of the caudal it is considerably deeper. Pupils black, irides of a dark brown, encircled within by a silvery ring. The general color of the caudal fin is similar to that of the inferior portion of the sides; its outer edge is flesh-colored.

*Description.* Body oblong, compressed. Its entire surface presents a fine, unyielding granulated surface. The depth of the body across, from the middle of the pectorals, is equal to rather more than half its length; from the tip of the dorsal to the extremity of the anal, measured across the body, the distance is equal to about the length of the fish. The length of the head, from the tip of the snout to the base of the pectoral fin, is equal to one fifth the entire length; the head is flattened over the snout, which is obtuse and projecting. Upon the top of the

head an arched ridge commences on a line with the anterior angle of the eye, and is continued to a line above the origin of the pectorals; thence a straight line is pursued to the dorsal fin. The sides of the head project out from the body, — quite prominently over the eyes to the branchial aperture. The eyes are oblong, small, convex, very movable in their orbits; their larger diameter is one fourth greater than their smaller. The nostrils are double, very small, situated just in front of the eyes. The mouth is small. The jaws are armed with a broad bony plate, much worn in front, sharp at its edges. The temporal orifice is oval, and situated just in front of the pectoral fin.

The dorsal and anal fins are triangular, and situated at the upper and lower posterior extremities of the fish; the former slightly the posterior. These fins are almost precisely equal in their length and height.

The caudal fin borders the posterior extremity of the body, and reaches nearly to the base of the dorsal and anal fins, although it is not really connected with them. This fin is scalloped, or divided into digitations, about eight in number, the fourth of which is the longest. The digitations in the specimen here described are much more unequal than in that mentioned in my "Report."

The pectorals are one third the height of the dorsal fin; their length is equal to more than one third their height.

The anus is large and corrugated, and situated a short distance in front of the anal fin. Directly in front of the anus commences a very obvious carina, which is continued to a line opposite the origin of the pectorals. The very dense texture of these fins renders it about impossible to determine with accuracy the number of their rays. As nearly as I have been able to distinguish, they are as follows: — D. 13. P. 12. A. 13. C. 8 – 9.

Length, five to six feet.

*Remarks.* Three specimens of this fish, carefully examined, present the following proportions.

One, described in my "Report," measured fifty-four inches in length; depth across from the middle of the pectorals, two and a half feet; from the top of the dorsal to the extremity of the anal fin, six and a half feet. Weight, two hundred pounds.

A second, seen by Dr. Jeffries Wyman, also noticed in my "Report," measured fifty-four inches in length; diameter of the operculum, three inches; of the eye, two inches; greatest breadth of the fish, thirty inches; pectoral fins, eight inches high, six long, composed of ten rays; anal fin, eighteen inches high, ten long, composed of eighteen rays; nine scallops to the tail, six in the broadest part.

The individual now described measured fifty-four inches in length, and was judged to weigh nearly five hundred pounds.

This species is occasionally met with during the summer season in Massachusetts Bay, sluggishly swimming near the surface. On account of the great elasticity of its exterior, it is captured with difficulty, by being gaffed at or near the branchial aperture. Dr. Yale, writing of this species to me, observes: "It has an entire cartilaginous case of an inch and a half to two inches thick, covering the whole body, perfectly white and milky in its appearance, and very elastic. A small ball of it, cut out and thrown with moderate force upon the ground, will rebound from fifteen to twenty feet." Its liver, which weighs eight or ten pounds, is very oily, furnishing two or more quarts of oil, which is used by the fishermen to grease their masts; it is also sometimes used by painters, although Captain Atwood tells me he does not think it preferable in this respect to other fish-oil. It is considered by many fishermen a valuable application for sprains and bruises, and by such it is preserved for these purposes.

Upon the exterior of the specimens described in my "Report" were attached several parasites; at the base of, or near to the fins, a large number of the *Pennella sagitta* were found imbedded, with their pinnated extremities projecting like tentaculæ, and to them were firmly fixed specimens of the *Cineras vittata*. One beautiful specimen of the *Tristoma coccineum*, figured by Yarrell as being taken from this species, was found firmly attached to the posterior extremity of the fish. Closely attached to the branchiæ were a dozen or more specimens of the *Cecrops Latreillii*. The thickness of the exterior varies from two to three inches. A large number of *Tæniæ* were found in the intestines. Several *Cysticerci* were imbedded in the substance of the liver.

Massachusetts, STORER. New York, MITCHILL, DEKAY.

## FAMILY XXV. BALISTIDÆ.

Body compressed. Snout prolonged from the eyes. Mouth small, with a few distinct teeth in each jaw. Skin roughened with prickles or scales. Dorsals, two; the anterior sometimes represented by a single spine. Ventrals often wanting or indistinct. Pelvic bone prominent.

## GENUS I. MONACANTHUS, Cuv.

Body covered with very small scales, bristling with stiff excrescences, and extremely crowded. The extremity of the pelvis projecting and spiny, as in the *Balistes*, but they have only one large dentated spine to their first dorsal, or at least the second is almost imperceptible.

### MONACANTHUS AURANTIACUS, *Dekay.*

### *The Orange File-fish.*

(PLATE XXXIV. FIG. 3.)

*Balistes aurantiacus, Orange File-fish,* MITCH., Trans. Lit. and Phil. Soc. of N. Y., I. p. 468, pl. 6, fig. 1.
*Monacanthus aurantiacus, Orange File-fish,* DEKAY, Report, p. 333, pl. 57, fig. 186.
" " STORER, Proceed. Bost. Soc. Nat. Hist., II. p. 72.
" " " Mem. Amer. Acad., New Series, II. p. 496.
" " " Synopsis, p. 244.

*Color.* The greater portion of the fish is of an orange-yellow; the lower portion of the sides and beneath of a bluish-white.

*Description.* Body oval, compressed. Its entire surface covered by minute prickles, which are very obvious when the hand is drawn towards the head. Abdomen tumid. A slight concavity is noticed upon the forehead; the dorsal outline is horizontal. The greatest depth of the fish is just back of the pectorals. The length of the head is equal to about one quarter its entire length. The mouth is small, prominent, protruding. The lower jaw the longer, with eight flattened teeth; the front teeth large, flattened, emarginated above; the teeth in the lower jaw smaller and lanceolate. The eyes are large and circular, situated just beneath the dorsal spine. The branchial aperture, which is linear and nearly as long as the dorsal spine, is situated just beneath the eye. The nearly straight dorsal spine is equal to one half the length of the head; it is slightly rounded on its anterior edge, grooved at its posterior base, and exhibits numerous very minute serrations upon its posterior superior edge. A small membrane is attached to its base, posteriorly.

Just before the second dorsal fin, which commences on a line slightly anterior to the anal, is a prominent projection. This fin is rounded above. The middle rays are the longest; all the rays are more or less flattened.

The pectorals are broad and rounded, and situated on a line directly beneath the eyes.

The anal fin, resembling the dorsal in its appearance, terminates just posteriorly to that fin.

The caudal fin is composed of stout, bifurcated rays.

The fin rays are as follows: — D. 1, 35. P. 12. A. 39. C. 12.

Length, seventeen inches.

*Remarks.* The only individual of this species I have known to have been taken in our waters was captured at Salem, August, 1845. It belongs to the Natural History Society of that city, and was kindly loaned me by Dr. Wheatland, one of the Curators of the Society, to determine the species. The fish, when discovered, was swimming about two feet from the bottom, near the wharf, and from post to post, biting off the barnacles attached to them. When taken, and lying upon the wharf, it made a chirping noise like a bird, and endeavored to wound his captor with his spine. While dying, the color of the abdomen changed as in the dolphin.

The specimen referred to had been injured in its capture, being speared; and had lost its proportions by the process of drying, preventing me at the time from preparing an accurate description. My excellent friend, James Carson Brevoort, Esq., the distinguished ichthyologist of Brooklyn, New York, has kindly loaned me a specimen which has enabled me to present the above account. Dr. Dekay observes that this is a rare species in the waters of New York, he having seen but two specimens.

In August, 1842, the late lamented Charles D. Bates, M. D., formerly of the U. S. Navy, sent me a figure and description of this fish which was taken in the harbor of Portland, Maine, when he was attached to that station. He observes in his letter to me: "This fish appeared, about a fathom under water, like a bit of kelp, and was rising toward the surface, when a fisherman, observing its motion, put his hand into the water, and the fish came directly into it and was caught." He adds: "It is called Hog-fish vulgarly, either from its snout resembling that of this animal, or from a sort of short grunting noise it makes on being taken out of the water."

Maine, Massachusetts, Storer. Connecticut, Linsley. New York, Mitchill, Dekay.

## MONACANTHUS MASSACHUSETTENSIS, *Storer.*

### *The Massachusetts File-fish.*

(PLATE XXXIV. FIG. 4.)

*Monacanthus Massachusettensis, Massachusetts File-fish,* STORER, Report, p. 174.
" " " " DEKAY, Report, p. 336, pl. 57, fig. 187.
" " STORER, Mem. Amer. Acad., New Series, II. p. 496.
" " " Synopsis, p. 244.

*Color.* Of a yellowish-brown, variegated over its entire extent with brownish markings and blotches; more obvious upon upper portion of sides. Numerous minute white cilia are suspended from its sides.

*Description.* Body oblong, very much compressed. Surface granulated. Its depth from the base of the dorsal spine is equal to half the entire length of the fish. Length of head equal to one fourth the entire length. Jaws of equal length; teeth stout. Eyes circular, equal to one fourth the length of the head. A strong, granulated, curved spine, half the length of the head, with small sharp spines upon its posterior lateral edges pointing downwards and backwards, is situated just back of the centre of the eye.

The second dorsal fin commences some distance back of the spine; it is composed of colorless rays, which are roughened at their bases.

The pectorals also are colorless, and rounded when expanded.

The pelvic bone projects, is quite movable, and is connected by a dewlap to the abdomen.

The anal fin, of the same form as the dorsal, commences just posterior to that fin: the rays of this fin are granulated at their base like those of the dorsal.

The caudal fin is of a darker color than the other fins.

Length, four inches.

The fin rays are as follows: — D. 34. P. 12. A. 34. C. 12.

*Remarks.* I have seen but one specimen of this species. This was sent to me in 1838, by the late Dr. Yale of Holmes's Hole, as having been found in Massachusetts Bay.

Massachusetts, STORER. Connecticut, LINSLEY. New York, DEKAY.

## MONACANTHUS SIGNIFER, *Storer.*

(PLATE XXXV. FIG. 1.)

*Monacanthus setifer*, DEKAY, Report, p. 337, pl. 59, fig. 194.
*Monacanthus signifer*, STORER, Mem. Amer. Acad., New Series, II. p. 497.
" " " Synopsis, p. 245.

*Color.* Of a reddish-brown color, with greenish reflections.

*Description.* Body elongated, compressed. The entire surface is very minutely granulated, by which a sensation of roughness is perceived, by the finger, over its whole extent, with the exception of the fleshy portion of the tail, and a small portion of the body just anterior to it; which parts are thickly studded with stiff setæ, looking and feeling like the teeth of a card, the points of which incline forwards, producing consequently this roughness only when the finger is drawn towards the tail.

The depth of the fish across the body from the base of the dorsal fin is less than half its length; the depth at the fleshy portion, to its greatest depth, is as one to four. The length of the head is equal to one fourth the entire length of the fish. The mouth is small. The teeth are sharp, and are four in number on each side. The eyes are circular. On the top of the head, back of the centre of the eyes, is situated a movable spine, terminating in a naked point, and armed posteriorly upon its sides with a number of small spines pointing downwards; these spines are more developed towards its upper portion.

The dorsal fin arises just back of the centre of the fish, and is nearly as long as the greatest depth of the fish; its second ray is the longest.

The pectorals commence on a line beneath the dorsal spine.

The pelvic bone is prominent, and terminates in a small stellated point; the dewlap to which it is attached is marked by large granulations, similar to those upon the rest of the surface.

The anal fin commences back of the dorsal; it is of a rounded form, and terminates opposite that fin.

The caudal fin is composed of very firm rays.

The fin rays are as follows: — D. 32. P. 16. A. 32. C. 10.

Length, five inches.

*Remarks.* Until the summer of 1842 I had not known of an individual of this species having been taken in the waters of this State. During that season, however, I saw specimens which had been caught at Hingham, Lynn, Nahant, and even in our harbor by means of seines. For the fine specimen from which my

drawing is made, I am indebted to John L. Tucker, Esq., formerly of the Tremont House of this city.

Previous to the appearance of Dekay's Report, I supposed this species to be Dr. Mitchill's *M. broccus*, and thus called it in the Proceedings of the Boston Society of Natural History, p. 84 (Sept. 1842).

Dekay described it as a new species, under the specific name of *setifer*. As, however, this name had been previously applied to another species of this genus by Bennett, in the Proceedings of the Zoölogical Society of London, Part I. p. 112, 1830, I have felt compelled to substitute another.

Massachusetts, STORER. New York, DEKAY.

## GENUS II. ALUTERES, CUV.

An elongated body, covered with small and scarcely visible granules; a single spine in the first dorsal; the chief character is the pelvis, which is completely hidden under the skin, and is without that spinous projection observed in the other Balistes.

### ALUTERES CUSPICAUDA, *Dekay.*

### *The Sharp-tailed File-fish.*

(PLATE XXXV. FIG. 2.)

*Balistes cuspicauda, Sharp-tailed File-fish,* MITCH., Amer. Month. Mag., II. p. 326.
*Aluteres monoceros, Unicorn File-fish,* (BLOCH,) STORER, Report, p. 175.
*Aluteres cuspicauda, Long-tailed Unicorn-fish,* DEKAY, Report, p. 338, pl. 59, fig. 192.
" " " " STORER, Mem. Amer. Acad., New Series, II. p. 497.
" " " " " Synopsis, p. 245.

*Color.* Coppery brown, with spots of pale bluish slate and of brassy yellow from the eyes to the tail and back half-way down the sides, arranged in rather regular series. Head, back, and throat of a dark olive-brown; lower part of sides and abdomen lighter. A pale greenish-blue tint on the cheeks and opercles. Irides brassy yellow. Dorsal spine dark. The last two thirds of the membrane of the caudal fin of a dusky brown, with the tips of the rays yellowish. The dorsal, pectorals, and anal almost colorless.

*Description.* Body elongated, compressed laterally. Its greatest height, which is just back of the dorsal spine, is equal to one third its entire length; its height at the base of the caudal rays is equal to about one fourteenth its length. Between the spine and the dorsal fin the back is nearly straight. The length of the head

is equal to one third the length of the fish. The facial angle is oblique, gradually sloping from the dorsal spine to the tip of the snout. The mouth is turned upwards. The teeth are sharp, pointed. The eyes are large and circular. The nostril is situated just in front of the anterior superior margin of the orbit. The branchial aperture is oblique.

The dorsal spine is short and serrated, having at its posterior base, connected by a membrane, a minute rudimentary spine.

The dorsal fin commences on the anterior half of the body; its central rays are the highest.

The pectoral fins are situated on a line beneath the eyes.

The anal fin commences opposite the dorsal, and terminates posterior to it.

The middle caudal rays are the highest; and all the rays, except the two outer, are filamentous.

Length, eight inches.

The fin rays are as follows, in four specimens: —

| | | | |
|---|---|---|---|
| D. 2, 32. | P. 10. | A. 34. | C. 12. |
| D. 2, 36. | P. 12 or 13. | A. 36. | C. 12. |
| D. 2, 37. | P. 13. | A. 40. | C. 12. |
| D. 2, 38. | P. 13. | A. 42. | C. 12. |

*Remarks.* I have seen a single specimen only of this species which has been taken in our waters. This was an immature fish sent me by Dr. Yale, from Holmes's Hole. As I had not met with Dr. Mitchill's paper on the "Fishes of New York," contained in the American Monthly Magazine, I described it in my "Report" as the *A. monoceros*, Bloch. Dekay, with recent specimens of the mature fish before him, was enabled to correct my error; and, through the kindness of J. Carson Brevoort, of Brooklyn, New York, to whom I have already expressed my indebtedness, I have been furnished with recent specimens, and notes, by which I am enabled to present the present description and remarks.

The color of this species varies exceedingly. Some specimens are almost as yellow as the *Monacanthus aurantiacus;* but most of them are of a dusky olive-brown, with cloudings of darker hue, and the series of spots of metallic brassy-yellow; while Dekay observes that he has seen them of a uniform brown, without any spots or clouds whatsoever. Brevoort tells me the species is very common in the month of September, and up to October 15th, in the narrow channels of the marshy Jamaica Bay. They are taken in nets altogether.

Massachusetts, Storer. New York, Mitchill, Dekay.

## FAMILY XXVI. OSTRACIONIDÆ.

Body triangular or four-sided, enveloped in a hard bony case, composed of numerous plates, soldered together in such a manner that only the mouths and fins are movable. No ventral fins; a single dorsal.

### GENUS LACTOPHRYS, DEKAY.

Body triangular; with strong spines directed backwards before the anal fin. Orbits usually spinous.

#### LACTOPHRYS YALEI, *Dekay.*

#### *Yale's Trunk-fish.*

(PLATE XXXV. FIG. 3.)

*Ostracion Yalei*, STORER, Bost. Journ. Nat. Hist., I. p. 353, pl. 8.
" " *Yale's Trunk-fish*, STORER, Report, p. 176.
*Lactophrys Yalei*, *Yale's Trunk-fish*, DEKAY, Report, p. 362.
" " STORER, Mem. Amer. Acad., New Series, II. p. 498.
" " " Synopsis, p. 246.

*Color.* Above, of a light leaden color; beneath, nearly colorless.

*Description.* Body triangular. Its entire surface is granulated and covered with hexagonal plates, each containing six raised lines, which diverge from the centre of the plate to the angles; these plates are much the larger posterior to the pectoral fins. From the posterior angle of the eye to the ligamentary substance at the base of the tail are included ten plates in a direct line; from the highest point of the back to the abdomen are nine similar rows of plates. Behind the dorsal fin is a surface of ligamentary substance, of a darker color than the rest of the exterior, extending to the caudal fin, and containing, just back of the dorsal fin, one isolated plate, apparently composed of portions of several plates. Upon the posterior portion of the abdomen are situated, laterally, two stout, naked, recurved spines. The mouth is large and prominent; the jaws are armed with elongated, strong teeth; the eyes are large, and elongated horizontally; the nostrils are directly anterior to the anterior inferior angle of the eye.

The fin rays are as follows: — D. 10. P. 12. A. 10. C. 10.

*Remarks.* The only specimen of this species which has been seen was discovered alive by Dr. Yale, in 1833, among the sea-weed on the beach at Martha's Vineyard, and was by him presented to the Boston Society of Natural History. In the

year 1836 I read a description of it to said Society, which was published in the first volume of their Journal, and afterwards in my "Report upon the Fishes of Massachusetts." This description I am again here compelled to present. The length of the specimen, in its dried state, is fourteen inches. From the contracted and wrinkled appearance of the ligamentary portion at the base of the tail, it must vary considerably from the size of the living fish.

Massachusetts, STORER.

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## CLASS II. CARTILAGINOUS FISHES.

Skeleton cartilaginous. Cranium divided by indistinct sutures. Gills generally fixed; the membrane without rays. Maxillary and intermaxillary bones either wanting or rudimentary; the palatines or vomer alone supplying their place.

### ORDER I. ELEUTHEROPOMI.

Gills pectinated, free, as in ordinary fishes, with one large external aperture on each side, furnished with a strong opercle; without rays. Upper jaw formed by the palatine bone, firmly united to the maxillary; intermaxillary rudimentary.

#### FAMILY XXVII. STURIONIDÆ.

The genera of this family approach to ordinary fishes, by their gills being attached only at one extremity. They have but one branchial aperture, which is very open; they have but one operculum, and are without rays to the membrane of the gills.

##### GENUS ACIPENSER, LINN.

Body elongated and angular, defended by indurated plates and spines, arranged in longitudinal rows; snout pointed, conical; mouth placed on the under side of the head, tubular, and without teeth.

## ACIPENSER OXYRINCHUS, *Mitchill.*

### *The Sharp-nosed Sturgeon.*

(PLATE XXXV. FIG. 4.)

*Acipenser Oxyrinchus, Sharp-nosed Sturgeon,* MITCH., Trans. Lit. and Phil. Soc. of N. Y., I. p. 462.
" " LESUEUR, Trans. Amer. Phil. Soc., New Series, I. p. 394.
" " *Sharp-nosed Sturgeon,* STORER, Report, p. 178.
" " " " DEKAY, Report, p. 346, pl. 58, fig. 189.
" " AYRES, Fishes of Brookhaven, L. I., Bost. Journ. Nat. Hist., IV. p. 287.
" " LINSLEY, Cat. of Fishes of Connecticut, Amer. Journ. Science.
" " STORER, Mem. Amer. Acad., New Series, II. p. 499.
" " " Synopsis, p. 247.

*Color.* Of a grayish-brown color above; silvery upon the inferior portion of the sides; white beneath. Pupils black, irides yellow.

*Description.* Body elongated, pentagonal. Entire surface granulated, excepting that occupied by five longitudinal rows of flattened plates, of the same structure as the covering of the head, but of a lighter color. The largest plates form the dorsal ridge; in younger specimens these plates are compressed at their sides, and terminate above in strong, sharp, recurved spines; while in this the spines on the dorsal ridge in some plates are obsolete, and the whole crest a mere sharp edge, and are obvious only on a few of the plates; radiating lines are distinctly seen running from the centre of these scales to their circumference; this row is composed of ten plates. In the specimen formerly described by me, measuring two feet and three inches in length, this row contained twelve plates. The first are the largest; that at the commencement of the dorsal fin by far the smallest; between the dorsal and caudal fins are situated four plates. In the specimen described in my "Report" two quite small plates were seen just back of the dorsal, forming a pair; next to these a much larger one, and, lastly, an elongated one at the commencement of the caudal fin.

A second row of bony plates, twenty-eight in number, placed obliquely, commences just back of the operculum, situated where the lateral line is usually observed in fishes, and is continued to the base of the tail; these plates are narrowed to a point at their upper extremities, obtuse at their lower extremities, widened in their centres, and, like the former, are crowned by spines, more or less prominent, from the bases of which radii diverge. The posterior plates are much the smaller.

Beneath this row, just back of the pectorals, commences a third row of plates, eight in number, placed vertically, larger than those of the last row.

The head is flattened above, slightly depressed between the eyes, and terminates

at the occiput in a rounded plate, which in the immature fish is pointed. The whole upper portion of the head is bony, and irregularly marked upon its surface.

The snout is blunted. The eyes are small, and their diameter is less than one fifth the distance between them. The nostrils are double, situated directly in front of the eyes; the posterior is much the larger. The mouth, without teeth, capable of great protrusion, with fleshy, lobed lips, is situated on the under surface of the head; half-way between the mouth and the snout are situated four cirrhi placed transversely with respect to each other, nearly as long as the mouth.

The dorsal fin is situated far back, at the posterior extremity of the body; it is deeply emarginated; its first rays are higher than its length.

The pectorals arise from a strong, triangular plate; their first ray is very large and strong; the seventh and eighth are the highest; the length of the fins at their base are less than one half their height.

The ventrals, which are placed far back, are subquadrangular.

The anal fin is opposite the dorsal; its length is equal to one half its height; its posterior rays are equal in height to one third the height of the longest rays.

The upper lobe of the caudal fin is nearly double the length of the lower; the membranous structure of this fin renders it difficult accurately to determine the number of its rays.

The fin rays are as follows: — D. 38. P. 28. V. 24. A. 23. C. 125.

Length, six to ten feet.

*Remarks.* The largest specimen I have seen, nearly six feet in length, was found at Deer Island. It is sometimes taken measuring even ten feet. The specimen above described was captured in the harbor of Provincetown, and measured four feet and six inches in length.

But little attention has as yet been paid in this country to the value of the sturgeon fishery in an economical point of view. The several species we possess might unquestionably be made useful. The following observations of Professor B. Jaeger, contained in the nineteenth volume of Hunt's Merchants' Magazine, for 1848, are worthy of perusal.

"The principal sturgeon fisheries are, without doubt, those on the Volga, near Astracan, and those on the Don, which are carried on chiefly by the Cossacks of that country, who find this occupation much more lucrative than agriculture, which they neglect entirely, in spite of the very fertile soil of their lands.

"The fish forms an important object of fishery and commerce to many nations, as well for its flesh, as for the caviare prepared from its roe, and the isinglass from

its swimming-bladder. The city of Astracan exports every year several thousand tons of pickled sturgeon and caviare for consumption in the Russian empire; and Odessa much larger quantities for Greece, Italy, France, and other parts of Europe.

"When the catching of the sturgeons on the Oby, the Volga, Jaik, and Don begins, there arrive at these places, from the remotest parts of the Russian empire, a considerable number of merchants, who purchase the fish and prepare them for transportation. The average price of one fish, without the roe and swimming-bladder, is generally $ 4. A large one, which weighs over two hundred pounds, is sold at from $ 4 to $ 6, and contains forty pounds of caviare, or prepared roe, which is sold for $ 1.50.

"The flesh is fat, very palatable, and much better in the summer, after the fish has been some time in fresh water. That which is not eaten fresh is cut into large slices, salted, peppered, broiled, and put in barrels, where it is preserved in vinegar, and fit for transport. A considerable quantity of their flesh is smoked. The wholesale price of pickled sturgeon is from $ 6 to $ 12 a hundred-weight. The caviare is prepared in three different manners, namely: —

"1. Two pounds of salt are added to forty pounds of roe, and dried upon mats in the sun. The price of forty pounds is $ 1.

"2. Eight tenths of a pound of salt are mixed with forty pounds of roe, then dried upon nets or sieves, and pressed into barrels. This is sold for a little more.

"3. The best caviare is that when the roe is put into sacks made of tow-cloth, and left for some time in a strong pickle. These sacks are then suspended, in order to let the salt, watery substance run off, and finally squeezed, after which the roe is dried during twelve hours and pressed into barrels. This roe, of which forty pounds are sold for $ 1.50 at the place, is that which is sent all over Asia and Europe as a considerable article of commerce, and known by the name of caviare, and is eaten with bread like cheese.

"Another very profitable part of the sturgeon is the swimming-bladder, of which isinglass is made. For this purpose it is cut open, washed, and the silvery glutinous skin exposed to the air for some hours, by which process it can be easily separated from the external skin, which is of no use. This glutinous skin is placed between wet cloths, and shortly after each piece is rolled up and fastened in a serpentine form on a board; after they are partly dry they are hung up on strings in a shady place.

"This valuable and extensive article of commerce is the isinglass of our shops, and is sold there for about $ 50 a hundred-weight.

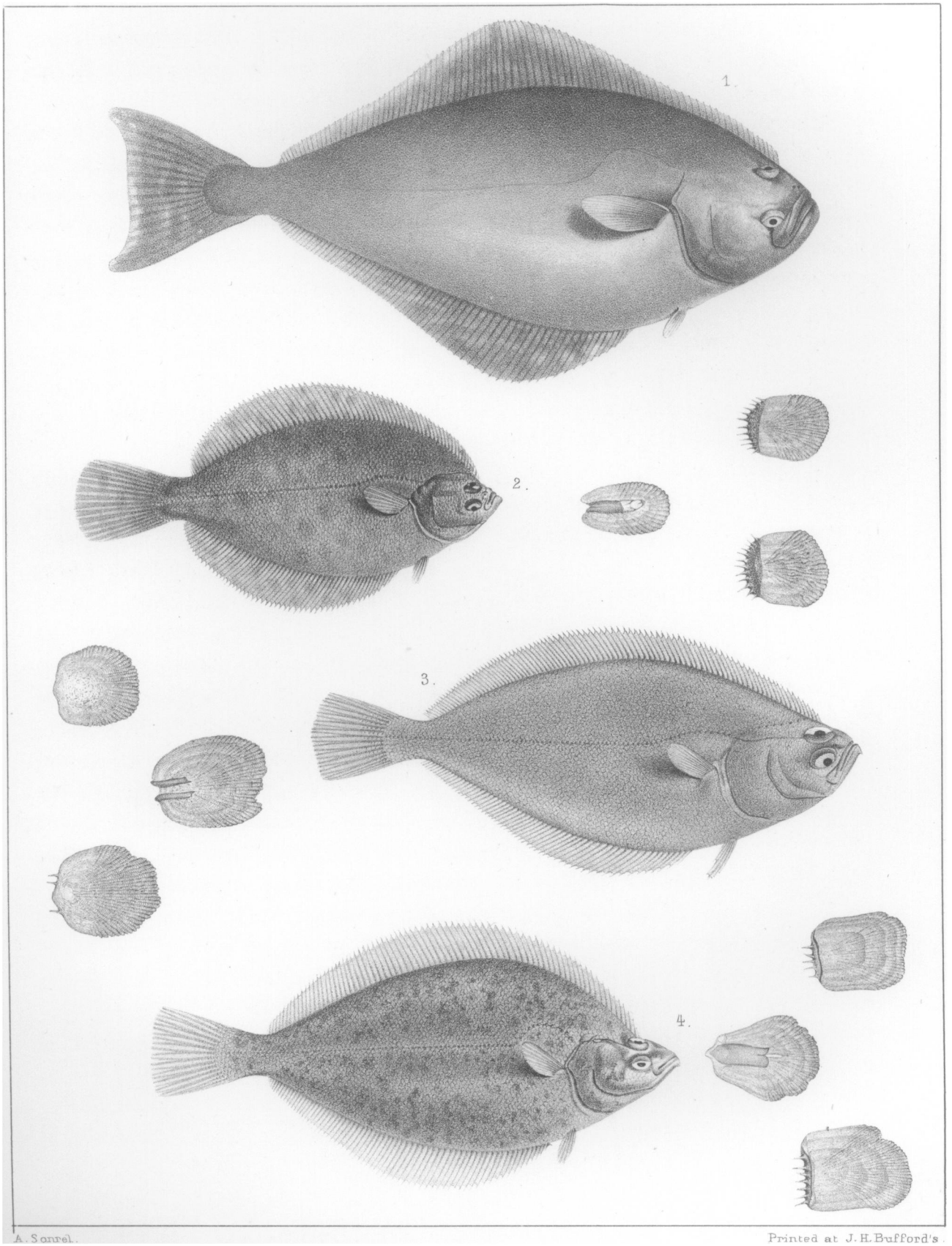
"There is made isinglass also from the swimming-bladder of the cat-fish, and of some others; but as this is very inferior to that from the sturgeon, it brings scarcely $10 a hundred-weight.

"The sturgeon is found in immense quantities in the United States and North America, from Virginia up to the highest habitable northern latitudes, where they ascend the rivers from three hundred to five hundred miles up. The Potomac, Delaware, Hudson, and principally the Kennebec, as well as many other rivers, contain such a quantity of sturgeons, that from those rivers alone, without counting those farther north of Maine, according to my calculation, the annual export of pickled sturgeon, caviare, and isinglass alone would be worth nearly half a million of dollars. Pickled sturgeon and caviare is a favorite food of the descendants of Spain and Portugal in South America, as well as of the inhabitants of the West India Islands, principally during Lent; and isinglass would be an article of home consumption, as well as for the European market.

"But the sturgeon is not a very favorite dish in our country; it brings scarcely five cents a pound in the market, and the roe and swimming-bladder are always thrown away. Our fishermen, therefore, are not much encouraged in catching these fishes, though, according to careful observations, from thirty thousand to forty thousand sturgeons could be annually caught in the rivers of the United States.

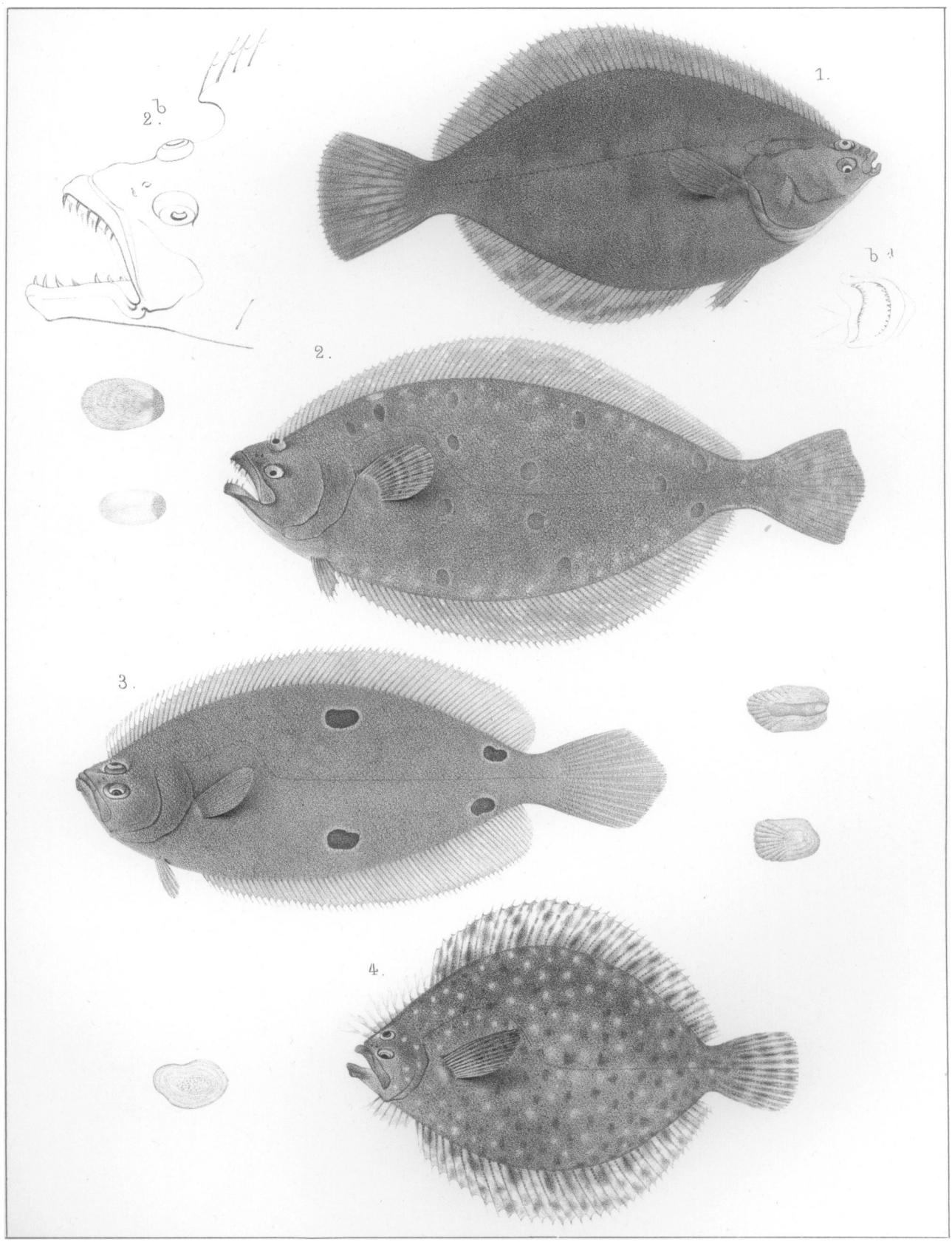
"The sturgeon was highly appreciated by the ancient Romans and Greeks. It was the principal dish at all great dinner-parties, and Cicero reproached epicures on account of their spending so much money for this fish. Pliny says that this fish was served at the most sumptuous tables, and always carried by servants, crowned with garlands of flowers, and accompanied by a band of musicians. And even at this time one pound of fresh sturgeon costs $4 in Rome, where this fish is very rare."

Massachusetts, STORER. Connecticut, AYRES, LINSLEY. New York, MITCHILL, DEKAY.



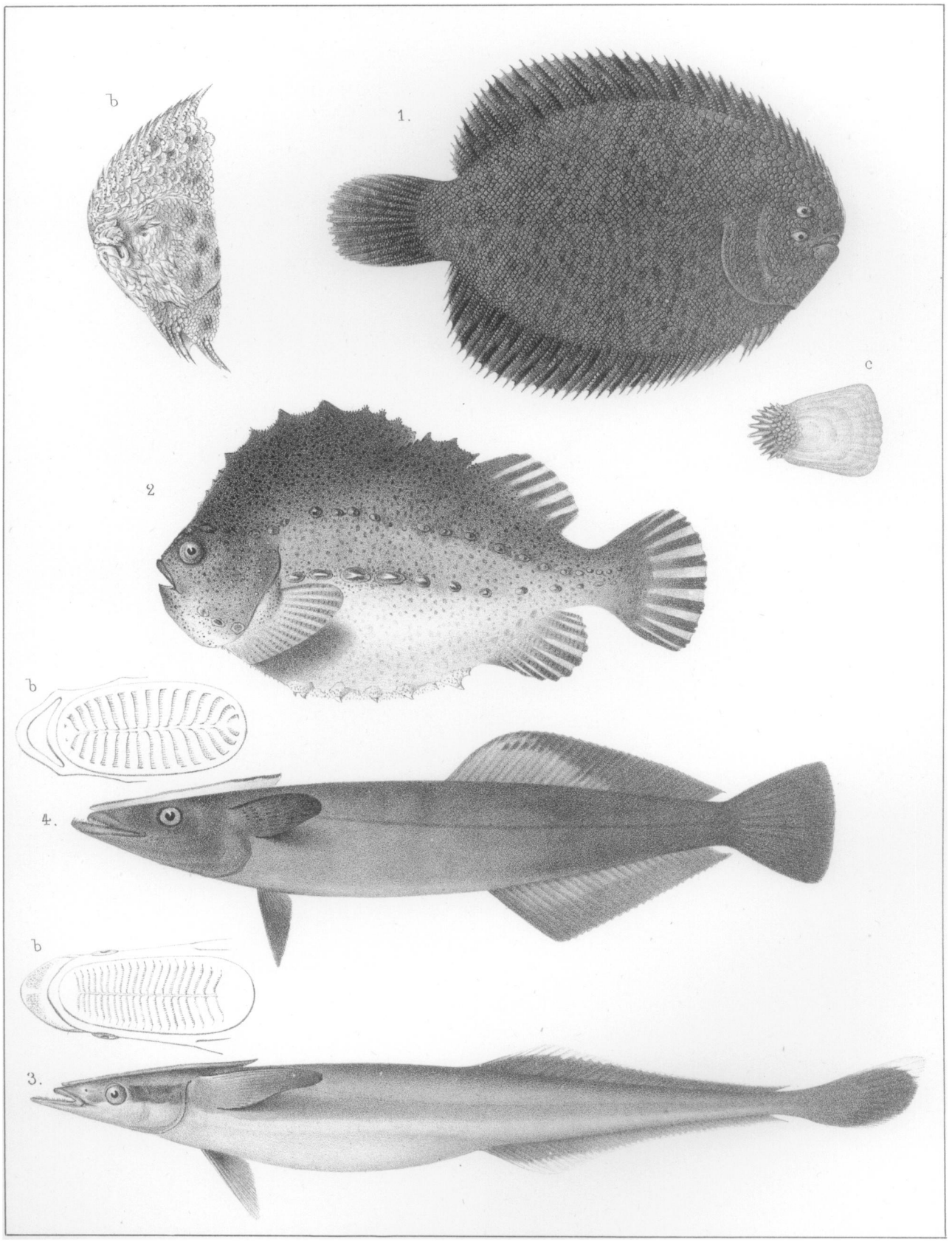

A. Sonrel. Printed at J. H. Bufford's.

1. HIPPOGLOSSUS VULGARIS Cuv. — 2. PLATESSA PLANA Mitch.
3. PL. DENTATA Mitch. — 4. PL. FERRUGINEA Storer.



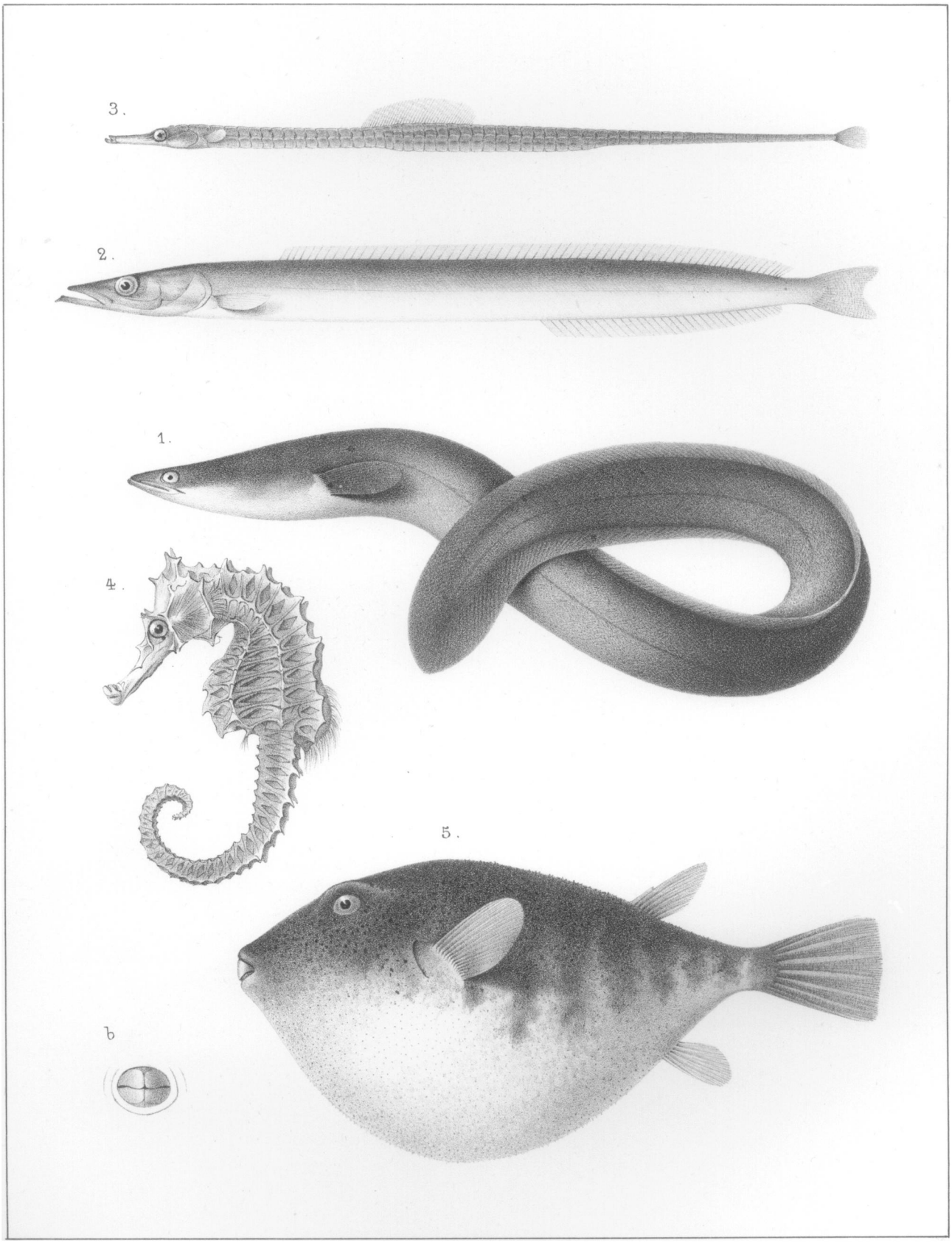

A. Sonrel & Tappan. Printed at J. H. Bufford's.

1. PLATESSA GLABRA Storer — 2. PL. OBLONGA Dek.
3. PL. QUADROCELLATA Storer. — 4. PLEURONECTES MACULATUS Mitch.




Tappan & Sonrel. Printed at J. H. Bufford's.

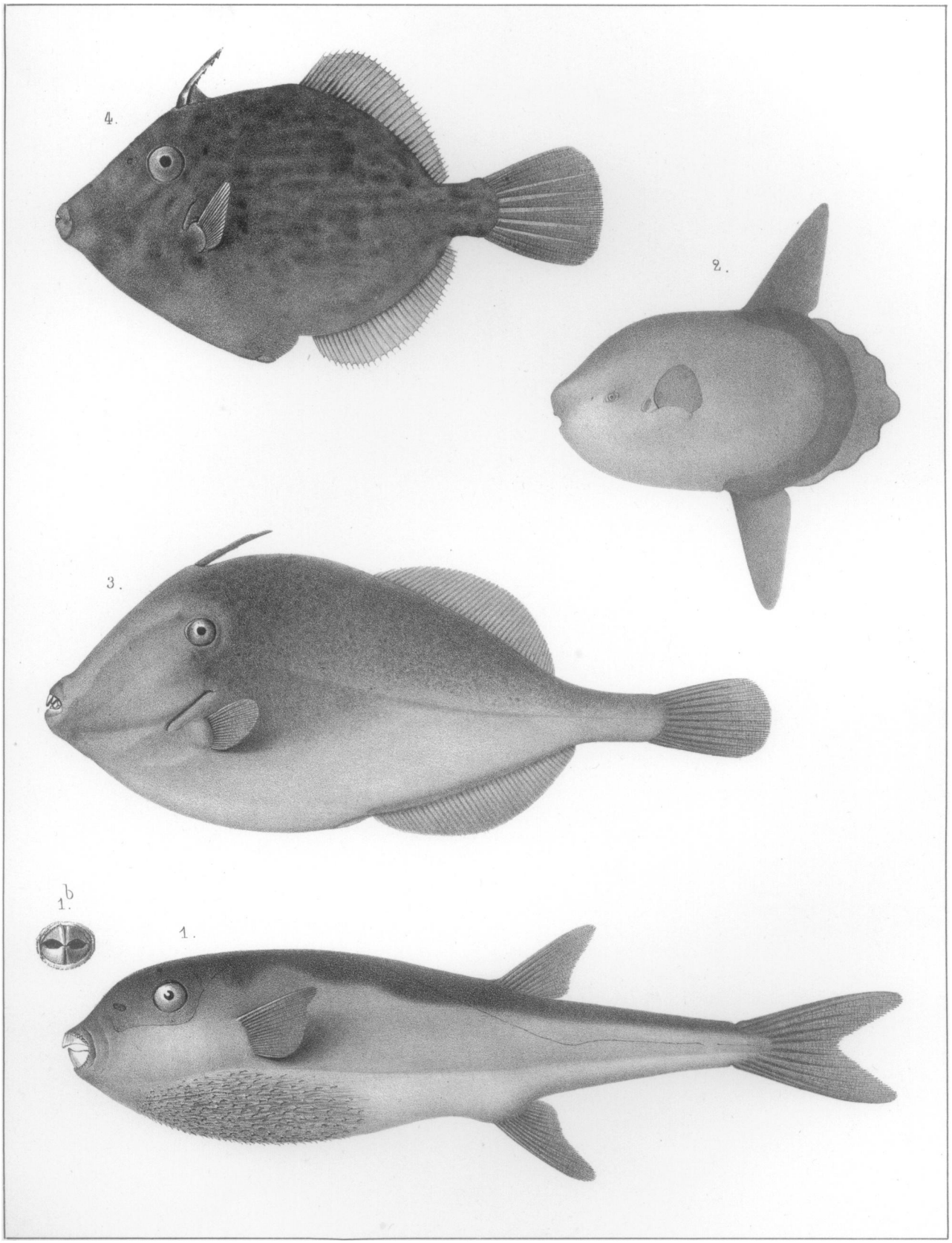
1. ACHIRUS MOLLIS Cuv. — 2. LUMPUS ANGLORUM Will.
3. ECHENEIS ALBICAUDA Mitch. — 4. E. QUATUORDECIMLAMINATUS Storer.




Tappan & Sonrel

Printed at J. H. Bufford's.

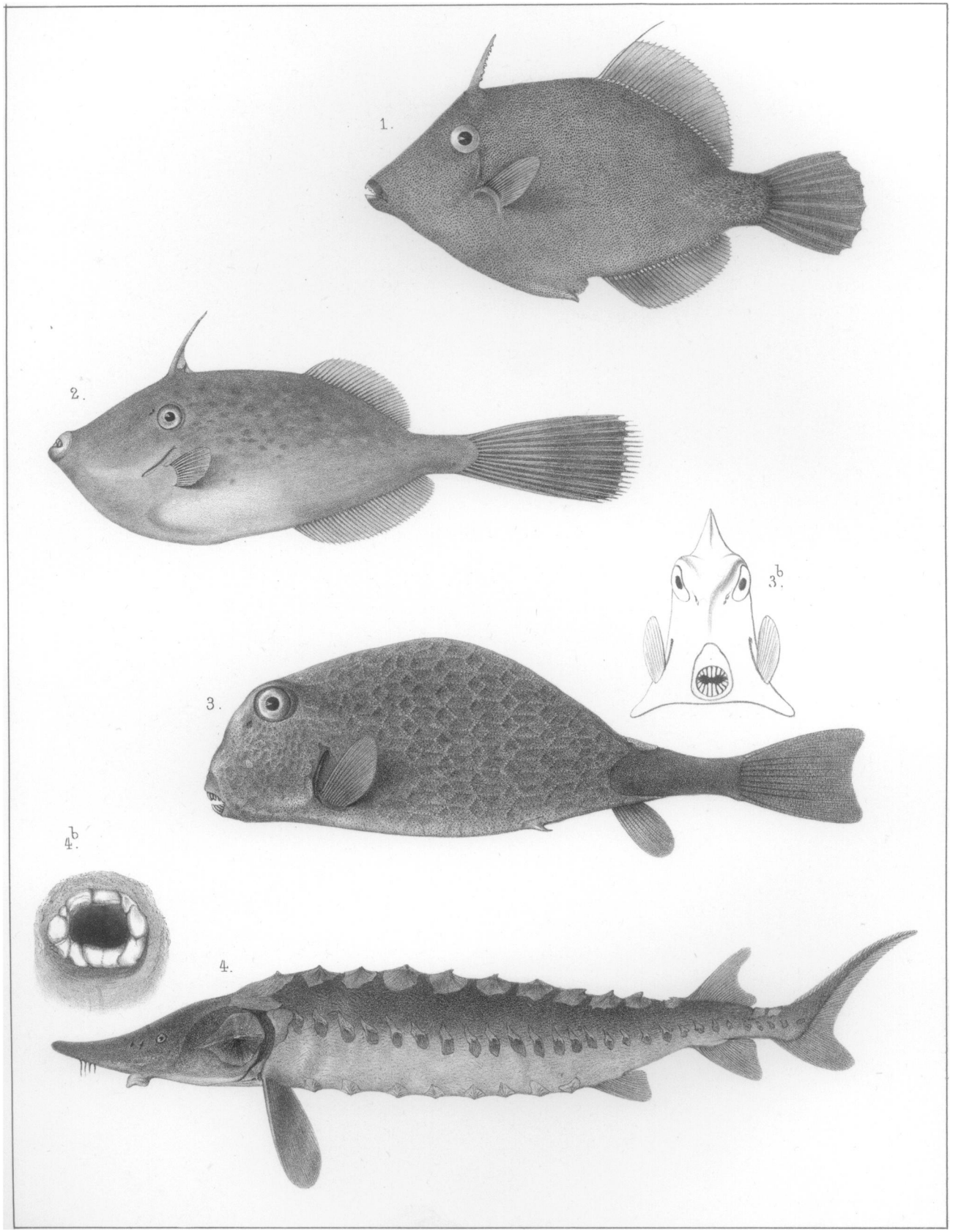
1. ANGUILLA BOSTONIENSIS Dek. — 2. AMMODYTES AMERICANUS Dek:
3. SYNGNATHUS PECKIANUS Storer. — 4. HYPPOCAMPUS HUDSONIUS Dek.
5. TETRAODON TURGIDUS Mitch.




Tappan & Sonrel.

Printed at J. H. Bufford's.

1. TETRAODON LAEVIGATUS Linn.— 2. ORTHAGORISCUS MOLA Schneider.
3. MONACANTHUS AURANTIACUS Mitch. — 4. M. MASSACHUSETTENSIS Storer.




Tappan & Sonrel.

Printed at J.H. Bufford's.

1. MONACANTHUS SIGNIFER. Storer. — 2. ALUTERES CUSPICAUDA Dek.
3. LACTOPHRYS YALEI Dek. — 4. ACIPENSER OXYRINCHUS Mitch.